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Fixing Costs for Gray Iron Castings

Analysis of Elements in Jobbing Foundry, for Varying
Production—Taking Adequate Profit
Into Consideration

BY H. P. PARROCK*

THAT the cost of any casting may be most closely approximated when each pattern is assumed to be the only pattern in use is the theory of this analysis of the cost of gray iron castings in a jobbing foundry. This presupposes sufficient duplicates to enable the standard quota of molders and core-makers, and other necessary labor, to return a day's work.

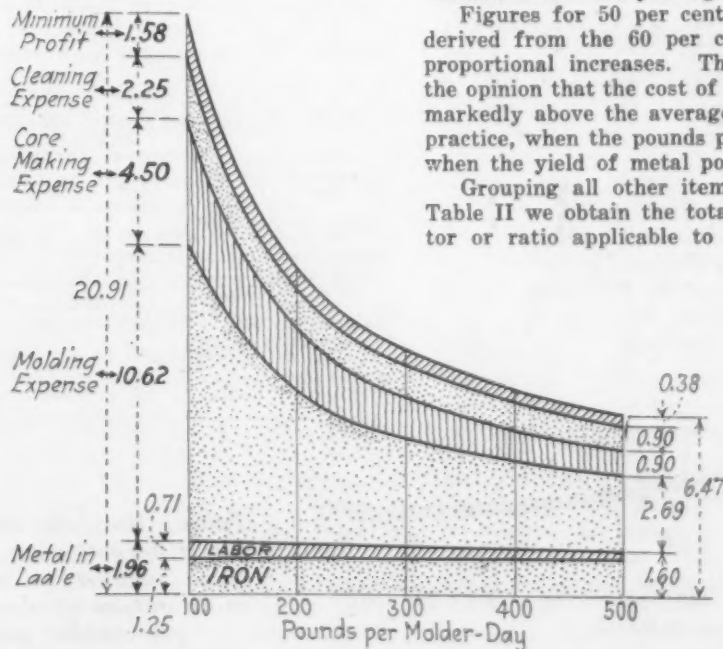
Expense sheets have been compiled for a shop of 100 molders, on the assumption that, during different periods, each molder would produce 100, 200, 300, 400 and 500 lb. of good castings per day; it is also assumed that one core-maker is required for every four molders in all instances. The figures are based on the following units of cost of labor and material, and on going rates for other items, listed in the details:

Cost of Materials and Labor

Materials	
Iron	\$26.88 per gross ton delivered
Coke	10.00 per net ton delivered
Stone	5.00 per ton delivered
Sand \$4.00, 5.00 and	6.00 per ton delivered
Oil	0.60 per gal. delivered
Compound	40.00 per ton delivered
Labor	
Molders	90 c. per hr. for 8 hr.
Core-makers	90 c. per hr. for 8 hr.
Helpers	55 c. per hr. for 8 hr.
Labor	50 c. per hr. for 8 hr.
Cupola	60 c. per hr. for 8 hr.
Cleaners	62.5c. per hr. for 8 hr.

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Fig. 1—Main Divisions of Costs in Foundry Operation, with Minimum Profit Added to Make a Fair Selling Price. This drops sharply as output per molder-day increases



The major divisions of cost are as follows:

Metal in ladle: iron, melting loss, coke, stone, labor, power, interest, maintenance.

Labor, except that for metal in ladle: molders, helpers, core-makers, common, cleaning, inspection, shipping, stores, production, time, carpenters, pattern making, pattern storage, office, supervision, maintenance, policing, trucking, administration, sales.

Fixed charges: interest, depreciation, taxes, water and sewer charges, power and light, fuel, insurance.

General supplies: sands, oils, compounds, molders' tools, maintenance supplies, fuel, miscellaneous.

Sales expense: traveling, advertising, but not labor.

Defectives: defective castings returned by the trade.

Metal in Ladle

Metal in ladle is not a fixed figure for any given iron and coke market. It varies with the yield of good castings per 100 lb. poured into the mold, and also with the total melt for any melting equipment. Assuming a melting loss of 4 per cent, Table I shows the probable variations in most jobbing foundries.

Figures for 50 per cent and 40 per cent yield are derived from the 60 per cent yield costs by making proportional increases. The table appears to justify the opinion that the cost of metal in the ladle increases markedly above the average figure usually assumed in practice, when the pounds per molder-day decrease and when the yield of metal poured falls off.

Grouping all other items of expense, as shown in Table II we obtain the total cost, and arrive at a factor or ratio applicable to direct labor to return this

It will be noted that the cost of metal in ladle shows only a slight drop as output gains. Nearly the entire advantage comes from other (relative) savings

general expense when estimating costs. Metal in ladle for a 50 per cent yield is used for convenience.

Table I—Metal in Ladle

Melt, net tons, 60 per cent yield	8.3	16.7	25.0	33.3	41.6
Good castings produced, lb.	10,000	20,000	30,000	40,000	50,000
Pounds per molder-day	100	200	300	400	500
Iron, c. per lb.	1.25	1.25	1.25	1.25	1.25
Expense, 60 per cent yield basis, c.	0.61	0.46	0.39	0.34	0.30
Metal in ladle, 60 per cent basis	1.86	1.71	1.64	1.59	1.55
Metal in ladle, 50 per cent basis	1.96	1.79	1.70	1.65	1.60
Metal in ladle, 40 per cent basis	2.06	1.96	1.77	1.70	1.65

Details of the Item "Expense" in Table I Follow:

Melt, tons 60 per cent basis	8.3	16.7	25.0	32.3	41.6
Good castings, lb.	10,000	20,000	30,000	40,000	50,000
Pounds per molder-day	100	200	300	400	500
Coke, c. per lb.	0.28	0.24	0.21	0.19	0.17
Stone, c. per lb.	0.01	0.01	0.01	0.01	0.01
Labor, c. per lb.	0.19	0.12	0.10	0.09	0.08
Power, c. per lb.	0.03	0.02	0.02	0.01	0.01
Interest, c. per lb.	0.08	0.05	0.04	0.03	0.02
Repairs, c. per lb.	0.02	0.02	0.01	0.01	0.01
Expense, c. per lb.	0.61	0.46	0.39	0.34	0.30

Proportional increases in the costs of Metal in Ladle corresponding to decreasing yields are determined as follows:

Expense for 60 per cent yield, 0.61c., times $\frac{60 \text{ per cent yield}}{50 \text{ per cent yield}} =$
Expense for 50 per cent yield, 0.71c.
Expense for 50 per cent yield, 0.71c., plus Iron, 1.25c. = Metal in Ladle for 50 per cent yield, 1.96c.

The cost of labor (Table II) is determined from the estimated number of men necessary to produce the various tonnages. Allowance is made for the fact that, under the conditions inherent in any plant of fixed dimensions and equipment, reduction in labor cannot be carried beyond a certain minimum. Labor is added to take care of the extra work involved as the tonnage increases. The numbers of men on the payroll for the different tonnages are as follows:

Good castings per day, lb.	10,000	20,000	30,000	40,000	50,000
Pounds per molder-day	100	200	300	400	500
Molders	100	100	100	100	100
Helpers	30	32	35	40	45
Core-makers	25	25	25	25	25
Helpers	2	3	4	5	6
Common labor	10	12	15	20	25
Cleaning	20	25	30	35	40
Trsp., shipping, stores	3	4	5	6	7
Production and time	4	4 1/2	5	5 1/2	6
Carpenters	2	2 1/2	3	3 1/2	4
Pattern makers	2	2 1/2	3	3 1/2	4
Pattern storage	2	2	2 1/2	2 1/2	3
Office	4	4	4	4 1/2	5
Supt. and foreman	9	9	10	11	12
Maintenance	3	3 1/2	4	4 1/2	5
Watchmen	2	2	2	2	2
Teamsters	1	1 1/2	2	2	3
Administration	2	2	2	2	2
Selling	1	1	1	1	1
Men on payroll, except for melting	222	235 1/2	252 1/2	273	295
Men on melting	4	5	6	7	8
Total on payroll	226	240 1/2	258 1/2	280	303

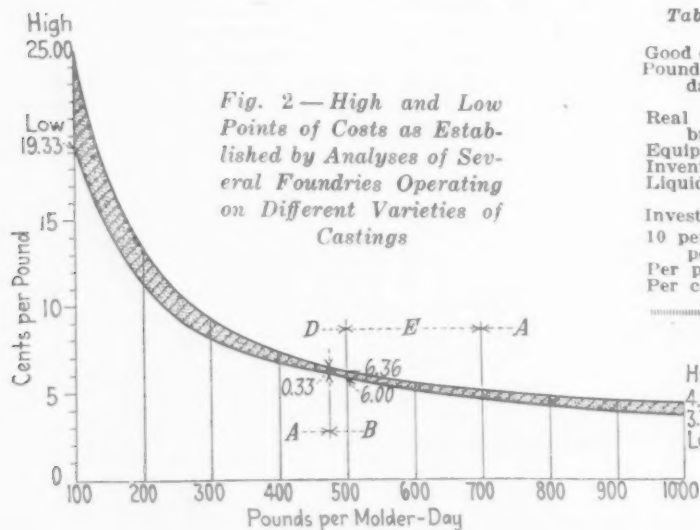


Fig. 2—High and Low Points of Costs as Established by Analyses of Several Foundries Operating on Different Varieties of Castings

Table II—Total Cost and Ratios

Good castings per day, lb.	10,000	20,000	30,000	40,000	50,000
Pounds per molder-day	100	200	300	400	500
Metal in ladle, c.	1.96	1.79	1.70	1.65	1.60
Labor, except melting	14.48	7.57	5.34	4.25	3.60
Fixed charges	2.12	1.13	0.81	0.65	0.55
General supplies	0.42	0.28	0.25	0.25	0.25
Defectives	0.25	0.12	0.08	0.06	0.05
Selling charges	0.10	0.06	0.05	0.04	0.04
Cost, c.	19.33	10.95	8.23	6.90	6.09
Less metal in ladle	1.96	1.79	1.70	1.65	1.60
General expenses	17.37	9.16	6.53	5.25	4.49
Direct labor	9.00	4.50	3.00	2.25	1.80
Ratio { General expense } { Direct labor }	1.93	2.03	2.18	2.34	2.50

The item of fixed charges (Table II) is determined as follows, the yearly amounts being reduced to a per-day basis, on the assumption of a 300-day production year:

Good castings, lb.	10,000	20,000	30,000	40,000	50,000
Real estate and buildings, \$250,000 @ 6 per cent	\$50	\$50	\$50	\$50	\$50
Equipment, \$125,000 @ 10 per cent	42	42	42	42	42
Inventories, \$50,000 to \$100,000 @ 6 per cent	10	12	15	18	20
Taxes, local and State \$6,000	20	20	20	20	20
Water and sewerage, \$900 to \$2,100	3	4	5	6	7
Power and light, \$9,600 to \$18,000	32	39	46	53	60
Heat, \$3,600 to \$4,800	12	13	14	15	16
Insurance, property	5	5	5	5	5
Liability	28	30	32	34	36
Liquid capital, \$50,000 to \$100,000 @ 6 per cent	10	12	15	18	20
Fixed charges per day	\$212	\$227	\$244	\$261	\$276
Per pound good castings, c.	2.12	1.13	0.81	0.65	0.55

The item for general supplies (not including melting supplies) has been deduced in the same general way.

Direct labor is the molder + core-maker wage, per pound, for work requiring one core-maker for four molders. The general expense ratio varies, increasing as the pounds per molder-day increase. It does not, in our opinion, remain a fixed ratio, such as 2 1/2, commonly used, except through a narrow range of work.

Minimum Profit

The profit to be added to these cost figures should not be less than that which will net a safe return on the money invested. For this analysis the amounts invested at different outputs, and the per pound margin necessary to a safe return, are shown in Table III.

The per cent profit increases as the pounds per molder-hour decrease; or, assuming perfect production from a pattern, as the cost per pound increases. For this analysis, these are the lowest margins that will return 10 per cent on the invested capital. Adding these profit figures to the costs as determined, the sales prices are recorded in Table IV.

It has been stated above that the ratio of general expense to direct labor is a variable, not a constant

Table III—Invested Capital and Minimum Profit to Net 10 Per Cent

Good castings, lb.	10,000	20,000	30,000	40,000	50,000
Pounds per molder-day	100	200	300	400	500
Real estate and buildings	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000
Equipment	125,000	125,000	125,000	125,000	125,000
Inventories	50,000	62,500	75,000	87,500	100,000
Liquid capital	50,000	62,500	75,000	87,500	100,000
Invested capital	\$475,000	\$500,000	\$525,000	\$550,000	\$575,000
10 per cent return per day	\$158.00	\$167.00	\$175.00	\$183.00	\$192.00
Per pound, c.	1.58	0.84	0.58	0.46	0.38
Per cent of cost	8.17	7.59	7.16	6.67	6.24

Taking the costs as a whole, the different cases examined came nearest to uniformity at an output of about 470 lb. per molder per day

factor. The use of one factor is a common one, but we believe that greater accuracy in bidding may be reached if molding, core-making and cleaning each have factors through which the general expense should

Table IV—Minimum Sale Prices; One Core-maker for Four Molders

	10,000	20,000	30,000	40,000	50,000
Good castings, lb.....	100	200	300	400	500
Pounds per molder-day...					
Metal in ladle, 60 per cent, c.....	1.86	1.71	1.64	1.59	1.55
General expense, c.....	17.37	9.16	6.53	5.25	4.49
Minimum profit, c.....	1.58	0.84	0.58	0.46	0.38
Sale price, 60 per cent yield, c.....	20.81	11.71	8.75	7.30	6.42
Sale price, 50 per cent yield, c.....	20.91	11.79	8.81	7.36	6.47
Sale price, 40 per cent yield, c.....	21.01	11.86	8.88	7.41	6.52

be estimated. We have not endeavored to deduce the factors for core-making and cleaning, but in Table V have used generally accepted factors, to arrive at a molding factor. Under this plan the errors that often creep in may be reduced to a minimum. Separating the cleaning costs in this way will facilitate the establishment of piece rating, or tonnage contracts, in the cleaning room. It will also uncover difficult cleaning jobs.

Having established a set of factors such as these in any shop, the estimator should follow them closely in the cost records, to note variations under changing conditions. Large-scale curves regularly plotted are a valuable aid in this detail. The principal facts are that molding, core-making and cleaning are separately handled; that the variation between costs of fast and

Table V—Expense Ratios

	10,000	20,000	30,000	40,000	50,000
Good castings, lb.....	100	200	300	400	500
Pounds per molder-day....					
Cleaning expense, R=2¼ ..	2.25	1.41	1.13	0.98	0.90
Core-making expense, R=2½ ..	4.50	2.25	1.50	1.12	0.90
Molding expense, R=Var..	10.62	5.50	3.90	3.15	2.69
General expense.....	17.37	9.16	6.53	5.25	4.49
Molding ratios.....	1.48	1.53	1.62	1.75	1.87

slow, or heavy and light, castings is allowed for; and that the variation in melting expense permits proper charges for high and low-yield pieces.

Fig. 1 reproduces the four main items of the cost of jobbing castings, adding the minimum profit to show the sales prices. The use of such a chart is an aid to the appraisal of cost of small, light, slow-running jobs.

(To be concluded)

Billet-Piercing Mill Manipulator

Device Carrying Two Mandrels, One Being in Action While the Other Is Being Unloaded

MANIPULATORS to increase production of rolling mills have found an extensive application in this country. It is rather surprising in view of this that the billet piercing mill has been more or less neglected, notwithstanding the fact that a comparatively simple manipulator such as described here might permit an increase in production per mill—possibly as much as 75 per cent.

One source of delay in piercing billets in such mills as the Mannesmann is due to the necessity to wait until the pierced tube has been stripped off its mandrel, before another billet can be pierced. This is due to the fact that only one mandrel at a time is employed in each piercing machine. The present device is designed primarily to eliminate this delay, and thus to increase the output of the mill.

This is accomplished by the employment of two mandrels and the control of the operation through the medium of a movable, preferably revolving, frame, in such manner that, while one mandrel is being stripped off its tube and made ready for the next cycle of operation, a new billet is being pierced on another mandrel, the whole operation being so planned as to insure the minimum of delay and lost time.

The device consists of a casting A, which carries a semi-circular runway B, extended by member C, the purpose of which is to hold in position the revolving frame, consisting of lower part E and upper part F. The two parts of this revolving frame are held together by bolts, and in their turn hold between them rigidly a cylindrical frame member J. Frames E and F also carry, respectively, guide forms K and L. Co. acting with them are guide forms M and N, carried on hinged arms O and P.

To understand the operation, assume that a billet, R, Fig. 2, is in the initial stage of being pierced. As its piercing continues, the first pierced portion enters between the guide forms K and M, and in doing so pushes back the collars T, U, etc. At the end opposite to the piercing point (hereafter referred to as the outward end) mandrel S carries a fitting V capable of engaging into socket W contained in a ball or roller thrust block X movable in and outward between ways Y and Z by cylinder 2A. The socket W is brought to

engage with fitting V before the start of the piercing operation.

When the latter has been completed, cylinder 2A is stroked outward (i. e., away from the piercing mill), thereby withdrawing mandrel S and tube R (made from billet R), bringing the fitting V to position Va, Fig. 2, whereupon rod 2B ejects fitting V from socket W. This is one of the novel features of the present device and works as follows:

Rod 2B is attached to the bottom of 2C of the stationary frame, of which part is constituted by the ways Y and Z previously referred to. In withdrawing the mandrel S and tube R, cylinder 2A travels away from the piercing mill, dragging with it, as part of the mandrel, fitting V held in socket W. This continues until a certain position is reached at which the tip of fitting V abuts upon the rod 2B freely passing through thrust block X. Cylinder 2A continues then to move, while fitting V is prevented from doing so, and is consequently ejected from socket W.

At this time the actuating device 4C (electric motor or compressed air cylinder) is brought into action. It releases the locking pin 2D and then turns the frame E-F through an angle of 180 deg. This, among other things, causes fitting V to travel in the groove way 2E until it reaches the mandrel-withdrawing clutch 2F, an important element of this device.

Construction and mode of operation of this mandrel-withdrawing clutch are as follows: It slides back and forth over guide rod 2G and is carried on guide shoe 2H and arm 2K, which latter is in its turn carried on piston rod 2L of the air (or hydraulic) cylinder 2M located in the center line of the manipulator. As shown in the drawing, the fitting V is in the clutch 2F; spring 2N is in compression, and presses clutch cover member 2P (shaped somewhat like a wide staple, and freely sliding on clutch rod 2R) against abutment 2S forming part of groove way 2E above referred to.

As cylinder 2M moves outward, it carries with it arm 2K; as clutch 2F moves at the same time, spring 2N forces clutch cover member 2P over the clutch 2F. This covers the opening through which fitting V entered the clutch, thus making it impossible for fitting V to slip out again until cover member 2P has been

Chromium Plating Is Expanding

Application to Steel Gages Notable—Hardness and
Brightness Are Features—What the Process
Is and Its Advantages

BY DR. WILLIAM BLUM*

JUDGED by the interest displayed and the publicity attached to this subject, chromium plating might well be called the sensation of the last few years in the field of protective coatings, a field in which there have been but few other radical changes in the last decade. Among questions that are no doubt now in your minds, and in those of many chemists and engineers, are "What is the future of chromium plating?" "Is it a practical process?" "What is its probable value when applied to engineering materials?" "In short, can we use it?"

In this informal talk I will attempt to answer, or at least to discuss, some of these questions, especially from the standpoint of the mechanical engineer. In doing so I am limited principally to the experience and contact of the Bureau of Standards, because so little authentic information has been published on this subject, especially in this country. As, however, a large number of industrial research laboratories are now engaged in the study of chromium plating, and hundreds of firms are trying it out for various purposes, it will no doubt be possible within a few years to make much more definite statements than are now justified.

Process Has Some Definite Advantages

In order for any new process or product to compete permanently with the established procedure, it must have certain definite advantages. It may, therefore, be well, before discussing methods and applications of chromium plating, to consider those properties of the metal which make it of special interest.

The outstanding property of chromium, when deposited under appropriate conditions, is its extreme hardness, as measured, for example, by its resistance to scratching. A bright chromium deposit, when tested in the Bierbaum apparatus with a sapphire point and a given load, yielded a scratch with a width of about 0.7 micron (the narrowest scratch of any metal thus far examined), while the cold-rolled steel on which it was deposited yielded a scratch about 2.2 microns in width. The great hardness of the chromium, and the fact that this as well as its other properties may be varied by the proper choice of plating conditions, at least justifies its consideration wherever hardness is an essential factor.

Another property of chromium that is distinctive is its resistance to tarnish or oxidation under many conditions of exposure. Thus it will stay bright for long periods, not only in an ordinary atmosphere, but also when exposed to a high humidity, to salt air, to fairly elevated temperatures, to molten tin and zinc, to many laboratory fumes, and to concentrated nitric acid. It is readily attacked and dissolved, however, by hydrochloric acid, and more slowly by sulphuric. This resistance to tarnish, therefore, justifies its consideration wherever a bright surface is necessary, as on mirrors, even though the reflecting power of chromium is somewhat less than that of silver.

Although chromium itself resists tarnish, it does not necessarily protect an underlying metal such as steel against corrosion, if the steel is anywhere exposed. Thus it may be readily shown that chromium-plated steel quickly corrodes at any points where there are pores or pin holes in the deposit. In this respect chro-

mium is similar to nickel and copper, and unlike zinc and cadmium, which latter will protect small areas of exposed iron because the zinc and cadmium dissolve more readily than the iron. Any superior protective action of chromium plating on steel above that of nickel plating must depend upon producing more nearly impervious deposits of chromium than of nickel. From present indications it appears probable that for such uses chromium will generally be applied over nickel plating of good quality, in which case the chromium is chiefly useful for its hardness and tarnish resistance.

With the definite advantages it possesses, it is no doubt surprising that chromium plating has been such a recent development. This condition is not the result of any lack of interest in the subject, but from inability until recently to so define and control conditions that consistent results may be obtained under industrial conditions. Chromium was electrodeposited by Bunsen as early as 1854, and since then numerous papers and patents have been issued on this subject. Of the more recent papers, that published by Sargent (a) in 1920 is probably of greatest interest, as most of the methods proposed since that date represent modifications of Sargent's solution, or of his operating conditions.

Sargent recommended a bath of which the major constituent is chromic acid (CrO_3) in a concentration of about 2.5 M or 250 g. per L. (33 oz. per gal.). To this he added a small amount, 3 to 5 g. per L. (0.4 to 0.7 oz. per gal.) of chromium sulphate, $\text{Cr}_2(\text{SO}_4)_3$. From such a bath, Sargent and others have obtained good chromium deposits, but frequently the results have been erratic. H. E. Haring, from a study at the Bureau of Standards (*Chem. and Met. Eng.* vol. 32, page 692, 1925) concluded that in such a bath it was necessary to regulate the acidity. This is accomplished practically by having present in the bath a colloidal suspension of chromium chromate, which may form automatically or may be produced by the addition of any basic or reducing substance.

Deposits Are of Three Types

Even more important than the exact composition of such a bath is the control of operating conditions, especially the temperature and current density. These have an appreciable effect in all plating operations but in chromium plating relatively small variations in these factors may change entirely the character of the deposit, or even prevent deposition entirely. Three principal types of chromium deposit may be produced, though of course these shade gradually into each other:

(1) At too low a current density or too high a temperature, a "milky" deposit is produced. This is relatively thin owing to the very low cathode efficiency under such conditions.

(2) At the appropriate temperature and current density, e.g. at 45 deg. C. (113 deg. Fahr.) and 10 to 20 amp. per dm^2 (100 to 200 amp. per sq. ft.), a bright deposit is produced.

(3) At too high a current density, or too low a temperature, the deposit becomes "frosty," gray and "burnt."

Of these deposits, the milky form is the softest, and the bright is the hardest, as measured by the scratch test.

With an appropriate solution, temperature and current density, it is a relatively simple matter to produce bright, hard deposits of chromium upon those articles where a nearly uniform current density may be se-

*Chemist, United States Bureau of Standards, Washington, and president of the American Electrochemical Society. Contributed by the Machine Shop Practice Division for presentation at the annual meeting, New York, Dec. 6 to 9, of the American Society of Mechanical Engineers.

(a) *Trans. Am. Electrochem. Soc.*, vol. 37, page 49, 1920.

cured, for example, upon nearly plane surfaces, cylinders, etc. Upon irregularly shaped articles, and especially those having deep recesses, it is very difficult to get a continuous deposit of chromium of uniform properties. Thus it may then be found that no metal is deposited in the recess, or else the deposit on the projecting parts is gray and spongy. The latter type of coating is hard to buff to a bright surface.

This poor throwing power of the chromium solution is due principally to the fact that the current efficiency decreases rapidly as the current density is lowered. Thus at 45 deg. C. (113 deg. Fahr.), the cathode efficiency at 20 amp. per sq. dm. (200 amp. per sq. ft.) is about 18 per cent, while at 5 amp. per sq. dm. (50 amp. per sq. ft.) it is only about 7 per cent, and at slightly lower current densities it is practically zero. This limitation appears to be an inherent defect of baths containing chromic acid, and while minor improvements in the throwing power may be effected, there is little reason to believe that it can ever be made to approach that of a nickel plating bath, much less that of a cyanide copper solution.

Another factor which may affect the introduction of chromium plating on a very large scale is the relatively large power cost involved. Ordinarily in electroplating the cost of power is negligible, or of the order of 1c. or less per sq. ft. With chromium, however, the power cost may be from five to ten times as great. This is due to several factors, especially (1) the low electrochemical equivalent of chromium in chromic acid, in which it has a valence of six; (2) the low cathode efficiency of chromium deposition, generally about 15 per cent, and (3) the higher voltage, generally 8 to 10 volts, required by the use of insoluble lead anodes and high current densities.

Cost of Chromium Is Not Prohibitive

The cost of the chromium itself is not prohibitive, as the metallic chromium in chromic acid at 40c. per lb. costs about 80c. per lb. as compared with nickel at 45c. A coating as thick as 0.025 mm. (0.001 in.) represents only about 3c. worth of chromium per square foot. The total cost of chromium plating is certain to be somewhat greater than that of nickel, as the investment, the power, and the labor cost are all higher in chromium plating. On those products for which the chromium has unique advantages, and especially where the general labor cost represents a large part of the entire expense, the greater cost of the chromium plating may be fully justified.

Among the possible applications of chromium plating, those dependent upon its great hardness are especially promising. One interesting example is its use on plates for printing currency and securities at the United States Bureau of Engraving and Printing, where the process and conditions developed by H. E. Haring at the Bureau of Standards are in successful operation. Some years ago the Bureau of Standards cooperated in the design and installation of a plant for reproducing these plates electrolytically. The plates produced by this process have a nickel surface, followed by alternate layers of copper and nickel, finally sweated to a steel plate. These plates are "intaglio," that is, the designs are below the plane surface, and before each impression the plate is inked and rubbed first with burlap and then with the hand. As all inks contain some abrasive particles, there is considerable wear on the plates. As was expected, the plates with a nickel surface did not last so long as the case-hardened steel plates that were formerly used exclusively.

By the application of about 0.005 mm. (0.0002 in.) of chromium to the electrolytic nickel plates, it was found that their useful life may be increased to about four times that of the nickel or twice that of the hardened steel plates. The impressions are usually sharper, and through the use of a smaller number of plates, greater uniformity and security of the product is obtained.

In other branches of the printing industry, it has been found that when very long editions are required,

as of labels and soap wrappers, chromium-plated electrotypes may be used to produce from three to six times as many impressions as can be made from the nickel electrotypes.

Chromium Increases Life of Gages

Of more direct interest to engineers is the application of chromium to gages. In a recent study at the Bureau of Standards (b) the performance of chromium-plated plug gages was compared with that of hardened steel gages. In these comparisons a wear testing machine, devised by the above authors, was employed. By its use, two gages were automatically moved up and down in hardened steel rings, and the wear was measured after a determined number of such gagings. From this study the following tentative conclusions were reached: When exposed to sliding friction, with no abrasive present, the chromium-plated gages resisted wear about five times as well as any of the steels tested. When, however, abrasives such as fine emery were present, the chromium-plated surface, while still superior to the steel, was only 30 to 60 per cent better. This latter result does not, however, mean that the chromium plating is unsuitable for resisting wear by finely divided abrasives such as emery under all conditions. Thus it was found in lapping wear tests that the chromium resists wear from two to four times as well as the customary gage steels. It is at least probable that, by depositing the chromium under different conditions, coatings may be produced which are best suited to resist each particular type of wear. For all those conditions of service in which chromium-plated gages may be found applicable, they have the advantage that a relatively soft steel may be used as a base and thus dimensional changes with time may be avoided.

In the experiments thus far conducted at the bureau, a relatively thick chromium deposit (about 0.02 mm. or 0.0008 in.) was applied, after which the surface was ground and lapped to the desired dimensions, leaving a somewhat thinner coating of chromium on the gage when it was tested. A simpler and more economical procedure would be to apply a relatively thin chromium layer (e.g. 0.005 mm. or 0.0002 in.) to a finished, accurately under-dimensioned gage. The latter could then be used directly after plating and, after a pre-determined length of service during which about half the chromium would have been removed, the remaining chromium could be readily dissolved off and a new coating applied. Whether such a procedure will prove practicable remains to be seen. While both laboratory tests and plant practice have indicated that chromium plating may not be universally advantageous on gages, the results are certainly sufficiently promising to warrant further investigation and trial.

The experience with gages at once suggests the application of chromium to other steel surfaces exposed to wear, and which now require special hardening processes. A few observations indicate that chromium plating on certain cams is practical and advantageous. On gears, it may be difficult to produce satisfactory deposits in the depressions, and the wear on the teeth is much more likely to detach the chromium coating. On stamping dies or other surfaces exposed to severe impact, it is at least probable that a light chromium coating would furnish little protection against the deformation of a soft steel base. If, however, chromium can be made to adhere permanently to a case-hardened die, it would preserve the details. On dies used in molding plastic materials, the application of chromium will probably be advantageous. More extensive experience than is now available, or at least published, will be required before a final conclusion can be reached regarding these and similar possible applications.

Uses of chromium dependent upon its resistance to some specific corrosive condition include such applications as the following: Molds for vulcanizing rubber may be chromium-plated to prevent sticking of the rubber to the mold. The resistance of the chromium to sulphur or many sulphur compounds, which leads to the above use, has also caused its consideration on oil-cracking equipment. The resistance of chromium

(b) H. J. French and H. K. Herschman. Preprint 18 of the American Society for Steel Treating, September, 1926.

to oxidation has suggested its use on glass molds, and on rollers for making plate glass. So far as is known, the latter two uses are still in the experimental stage.

Chromium Plate Makes Good Reflectors

The luster and permanence of chromium plating warrant its consideration for reflectors, especially those that are exposed to sulphur fumes such as in locomotive headlights and flood lights. Even though its reflective power is only about 60 per cent as compared with 90 per cent for silver, the rapid tarnishing of the silver more than compensates for this initial difference.

Whenever a bright surface is required, that is not exposed to severe corroding conditions, the application of chromium directly to steel will be advantageous, for example, on rules and scales for shop use. Where, however, steel articles are to be exposed to the weather, it will be found desirable to apply a coating of chromium (0.005 mm. or 0.0002 in.) over a substantial nickel coating (of 0.025 mm. or 0.001 in.) or still better over a coating composed of a copper and a nickel layer, or a nickel, copper and nickel layer. In the automobile industry great interest is being shown in such applications of chromium plating, and one make of car is now made with chromium plating on the radiator. As previously indicated, the value of chromium under such conditions depends largely on its luster, and its

resistance to tarnish and abrasion. There is little reason to believe that the chromium will materially increase the resistance to corrosion of the steel under severe conditions of exposure.

On brass articles, such as plumbing fixtures, where there is little tendency for the base metal to corrode, the chromium may be plated either directly on the brass, or on a nickel-plated surface. In the latter case, however, it is essential that the nickel plating should be very adherent, otherwise it will peel during the chromium plating. The more rapid adoption, or at least trial, of chromium plating for such fixtures is undoubtedly hampered by the poor throwing power and the greater personal attention required for consistent production.

With so many research laboratories engaged in the study and development of chromium plating, it seems safe to predict that even though no revolutionary developments appear probable, at least with the present type of bath, a fund of experience will soon be gained, upon which will be based the application of chromium plating to those many purposes for which it is especially suited. Chromium plating is not a panacea; it will not replace all other forms of plating. It will serve, and indeed has already served, many purposes better than other metals, and some that other metals cannot serve.

Considers Standardization of Frame Dimensions for Motors

A general conference to determine whether the standardization of certain dimensions of electric motor frames shall be undertaken was held under the auspices of the American Engineering Standards Committee, Dec. 10, at the Engineering Societies Building, New York. The conference was called by the A. E. S. C. at the request of the National Machine Tool Builders' Association, and was attended by a number of representatives of organizations interested in the project. C. E. Skinner, chairman of the A. E. S. C., presided.

Correspondence of the A. E. S. C. with a number of important organizations is said to indicate that there is considerable interest in the standardization of motor frames which would secure interchangeability between motors used for driving certain mechanical devices, such as machine tools, pumps, hoists, etc.

The status of foreign practice in the matter was outlined by John Gaillard, mechanical engineer of the A. E. S. C., who said that the question was discussed at a recent conference in Zurich, Switzerland, of standardization experts from German, French and Swiss industries. It was brought out that in Germany, a standard series of shaft heights for electric motors has been established, and for some kinds of motors, standard distances between the bolt holes have been adopted in addition to the standard shaft height.

Among those speaking in favor of the project were E. F. Du Brul, general manager of the National Machine Tool Builders' Association; E. J. Kearney, secretary of the Kearney & Trecker Corporation, Milwaukee; B. P. Graves, designer, Brown & Sharpe Mfg. Co., Providence; T. R. Jones, Cincinnati Milling Machine Co., Cincinnati; and a representative of the Association of Railway Electrical Engineers. J. M. Hipple, representing the National Electric Manufacturers' Association spoke in opposition.

It was recommended that the scope of the work include the following five items: A series of standard dimensions for the distance from the base to center of shaft (shaft height); a series of standard distances between bolt holes, at right angles to the shaft; a series of standard distances between bolt holes, parallel to shaft; certain definite combinations of a shaft height with any or both of the distances between bolt holes as mentioned under the first and second items; and an attempt to establish maximum diameter and length of motor for a given horsepower.

It was moved to appoint a special committee of three to consider sponsorship. This committee, ap-

pointed from the floor, includes a representative of the National Machine Tool Builders' Association, the National Electric Manufacturers Association and the Association of Railway Electrical Engineers, respectively. The committee is to meet and transmit its report to the chairman before Jan. 15. The report will then be submitted to members of the conference for letter ballot.

Foundrymen to Hold 1927 Convention in Chicago in June

The 1927 convention of the American Foundrymen's Association will be held in Chicago the week of June 6, according to a decision made by the board of directors at its annual meeting in that city Dec. 7. It has already been announced that this convention will be held without an exhibition, the latter having been postponed to the spring of 1928. The board of directors at the same meeting deferred the selection of a location for the 1928 meeting until later.

A feature of the meeting of the board last week was a luncheon in honor of Alfred E. Howell, who was retiring after a continuous contact as a director for 17 years. President Root had appointed past presidents R. A. Bull, B. D. Fuller and G. H. Clamer as a committee on resolutions. These, beautifully illuminated, were mounted in a leather case and presented by Major Bull. Mr. Fuller then gave to Mr. Howell a writing set and Mr. Clamer presented a cigarette case, all suitably engraved.

Name of Ulster Iron Works Unchanged

The Ulster Iron Works, Dover, N. J., which was recently taken over by a new management, has not changed its corporate name to the Dover Iron Works, as was indicated in THE IRON AGE of Nov. 18, page 1449. The latter is the name of a holding company formed at the time of the transfer of ownership, but the name of the operating corporation remains the same as heretofore. The names of the new officers of the Ulster Iron Works, together with a brief review of the company's history, were published in THE IRON AGE of Dec. 2, page 1560.

The Pittsburgh Foundrymen's Association will hold its annual Christmas dinner and entertainment at the Fort Pitt Hotel, Pittsburgh, Monday evening, Dec. 20.

Copper and Brass Manufacture

Discussion of Methods of Rolling and Heat-Treating for Producing Non-Ferrous Wire Sheets and Other Materials

WILLIAM R. WEBSTER, vice-president Bridgeport Brass Co., Bridgeport, Conn., discussed the copper and brass industry recently before the Metropolitan section of the American Electric Railway Association in New York. He took up particularly the relation of the industry to transportation, as reported briefly in *THE IRON AGE* of Oct. 7. What follows consists of abstracts from his paper.

Cake copper, the principal product of the copper refining plant, is used for the purpose of making sheets. These cakes are cast in various sizes according to specification requirements. They are heated to a bright red and passed between heavy rolls until they are reduced to the required thickness. After being rolled, they are trimmed to the required width and length. For certain purposes, hot-rolled sheet is given a further finishing rolling cold, which materially stiffens it and improves its surface and appearance.

Of major importance to the transportation industry is the wire bar. This weighs ordinarily about 200 lb. and is some 4 in. square by 4 ft. or so long. After being heated to a bright red, wire bars are reduced in one hot-rolling operation to a wire rod, usually having a diameter of $\frac{1}{4}$ in. These are reduced to wire by drawing through a succession of dies.

For some purposes, where strength is a requisite, such as trolley and telephone line wire, the finished wire is left in the hardened condition produced by the drawing process. For other purposes, where flexibility is desired, it is annealed by heating to a red heat. There are

innumerable variations in requirements, which govern the treatment to be used.

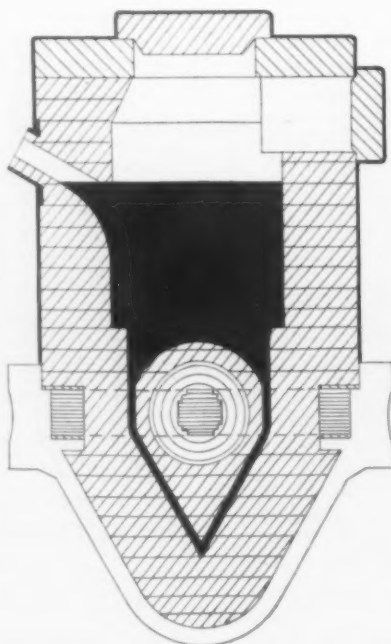
For large quantity production, the electric furnace has almost completely supplanted the crucible for melting copper and zinc in making brass. The furnace shown consists of a cylindrical shell with a top opening, a side opening and a pouring spout. It is lined with refractory material to form a cylindrical vessel, de-

pending from the bottom of which is a V-shaped channel formed in the refractory lining.

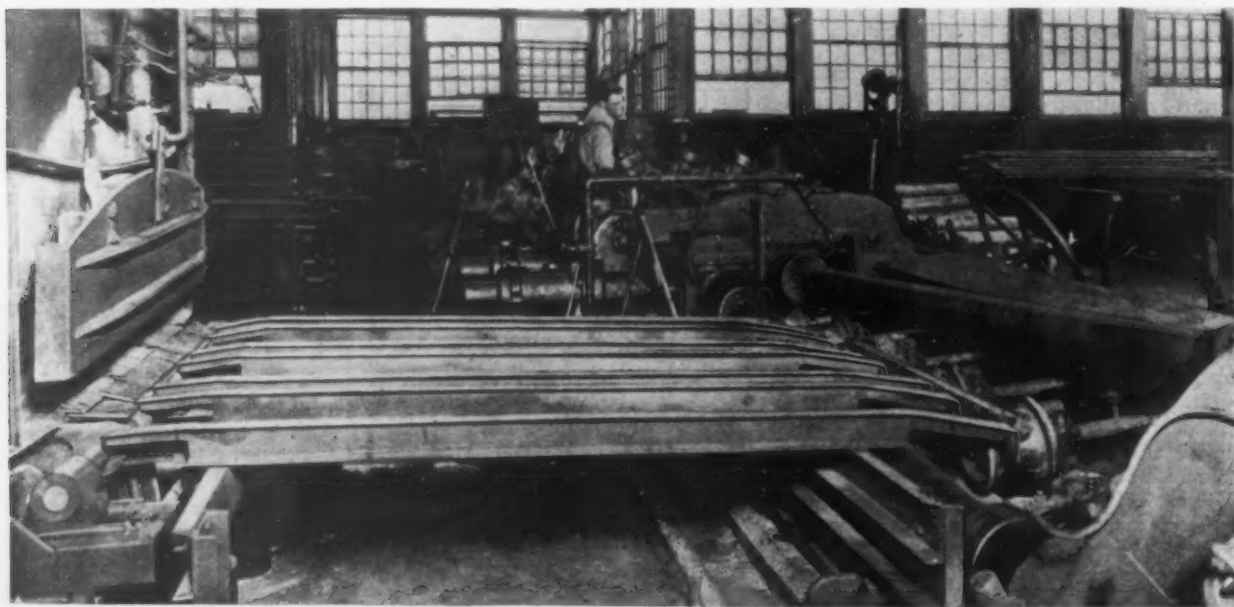
When the furnace is partially filled with molten metal this channel becomes a closed metallic circuit and forms the secondary of a transformer, the primary portion of which is built into the body of the furnace. If an alternating current is passed through the primary, an induced current is set up in the secondary. This heats the metal composing the latter and at the same time produces a violent circulation of superheated metal within the body of the furnace, by means of which the charge of solid metal, introduced from time to time, is melted.

Seamless Tube Making

For making tubes by the hot-rolling or piercing process, the range of brass alloys capable of being worked at a red heat is limited, but for some purposes brass is perfectly suitable. Heated billets are entered into the tube-rolling mill, which consists of a frame in which are mounted horizontally a pair of axially inclined rolls of somewhat the form and dimensions of a beer keg. These rolls are mounted axially at an angle so that, as the billet



Elementary Diagram of Wyatt Electric Heating Element. Application of heat at the bottom of the mass of metal causes a circulation which draws the colder metal continuously to the bottom and in this way effectively distributes heat throughout the mass. A violent propulsion of metal from both legs of the lower triangle thoroughly mixes the charge and carries the heat to all parts of the bath



Hot Billet Entering Piercing Mill After Leaving the Heating Furnace at Left. The billet is subjected to the cross-rolling action of three rolls placed at an angle to its axis and in such a way that the point of contact describes a spiral drawing the billet forward. Just as the billet leaves the rolls it encounters a hardened point over which it is forced to travel and the function of which is to open up the billet and form it into a tube

enters, it is given a rotating motion and also a motion of translation.

Between the rolls a piercing point is supported on the end of a long rod. As the rolls revolve, the solid billet or blank is rotated and fed forward in somewhat of a corkscrew manner over this point, coming out in the form of a tube. After coming from the piercing rolls, seamless tube, both copper and brass, is finished to the desired diameter and thickness by successive cold-drawing operations.

Brass Rods by Extrusion

Another product of the industry which has large application in practically all of the metal-using industries is the brass rod, which is used almost exclusively in the automatic screw machine. An indefinite number of small shapes, of more or less complicated circular section, are made on the automatic screw machine.

To make the brass rod, a billet is cast approximately 7 in. in diameter and about 5 ft. long. This billet is cut in two for greater ease in handling, and then heated to a bright red. From the heating furnace it goes into the extrusion machine, which consists of a powerful hydraulic press capable of exerting a pressure of from 1500 to 2500 tons.

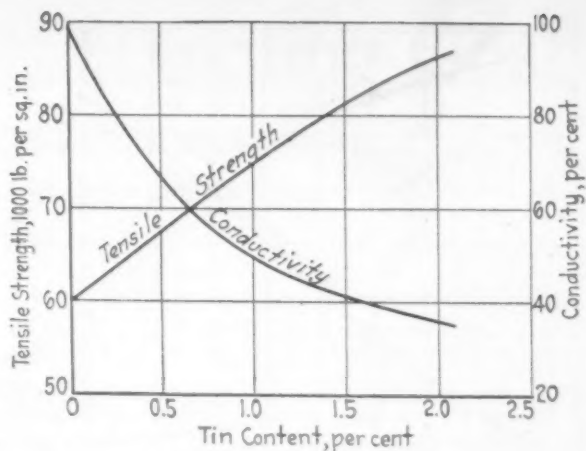


Rolling Brass Sheets on a Cold Mill to Procure a Smooth, Glossy Finish and a Hard Surface

In the far end of the machine is a hollow cylindrical block of steel known as the container, somewhat like the breech end of a rifled gun. The piston carries at its forward end a cylindrical ram which fits rather loosely in this container, and is capable of traversing it from one end to the other. With the piston drawn back, the cylindrical billet is placed in this container, and a die having a hole of suitable size and dimensions is positioned in the far end of the container.

Then the machine is operated so that the piston advances the ram into the container and pushes the hot metal out through the die into a long length. The product is usually of a round cross section, although the machine is capable of making almost any cross section desired. At the end of the stroke, the die is removed and the small portion of the mass which remains is pushed out of the machine and cut off. The resulting rod is cut up into lengths and is then drawn cold through dies to the finished dimensions.

For anything over about $\frac{1}{2}$ in., only one drawing operation is required, but that is about the limit of size that the extrusion machine will produce. Hence smaller sizes are given a number of successive reductions through dies, being annealed between draws, because the drawing operation hardens the material and reduces its ductility. The smaller sizes are drawn

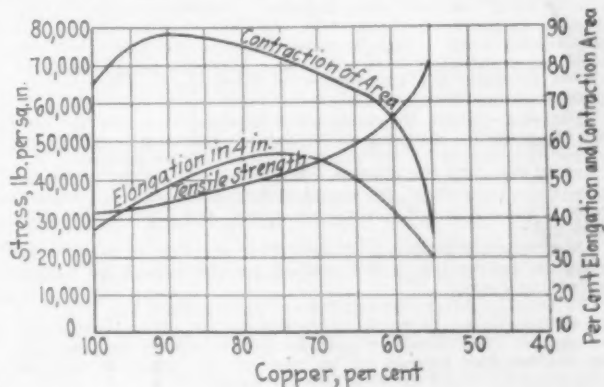


Relation Between Tensile Strength and Tin Content, and Between Conductivity and Tin Content, in a Bronze Trolley Wire

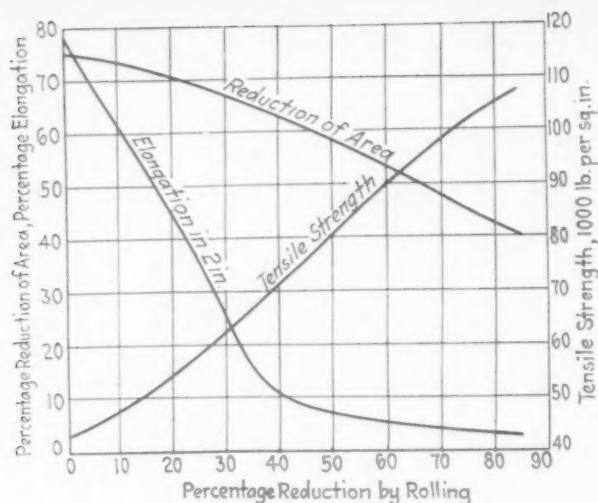
on blocks precisely similar to those employed in drawing copper wire, and are in some cases shipped as brass wire, or they may be straightened and shipped

out as rod.

Within the last year or two, it has been found that the problem of maintaining the supporting wires for the contact wire in steam railroad electrification was one of considerable magnitude. The problem was put up to the manufacturers, of supplying a non-corrosive material which would have the requisite strength to



Physical Properties of Cold-Rolled and Annealed Copper-Zinc Alloys



Mechanical Properties of Common, High Brass

enable it to take the place of the steel wire which had previously been employed.

A wire now has been developed which is highly non-corrodible on the one hand, and has a tensile strength of over 125,000 lb. per sq. in., on the other. This has been furnished to a number of railroads.

TRADES TRAINING

Development of Incentives Important—Methods of the Westinghouse Electric & Mfg. Co.

The establishment of constructive incentives as an important phase of modern apprenticeship was stressed by Carl S. Coler, manager of the educational department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, in a paper on "Trades Training," presented Dec. 8, during the forty-seventh annual meeting of the American Society of Mechanical Engineers. Mr. Coler's paper was given in abstract at a session devoted to education and training for the industries. It dealt particularly with the methods of training which have been found effective in adjusting the old apprenticeship system to modern conditions and outlined methods used by his company in promoting trades training.

Some of the incentives which have been found effective were listed by Mr. Coler as follows:

Wage.—An increase in rate is given every six months during the course, the rate of increase being greater during the latter years.

Grading.—Each apprentice is graded by the trades-apprentice committee at the end of each ten-month period for each year of his course.

Individual Attention.—The special attention of the foremen and members of the trades-apprentice staff is of great aid in stabilizing the trades-apprentice group.

Preference in Work.—Apprentices who show marked ability, or who are unusually diligent in their work, are recognized by being shown some preference in the kind of work on which they are placed and the length of time which they spend on each kind of work.

Experience Outside of Plant.—Cooperative relations are maintained with the subsidiary plants of the company and with certain outside organizations. Apprentices are given outside assignments from time to time as a reward for meritorious work. This provides some of the same benefits which were formerly received by the journeyman who started out to broaden his experience by securing employment in various plants.

Diploma.—Upon the completion of the course the apprentice is granted a diploma specifying his qualifications for the trades and signed by the proper officials of the company.

Publicity.—At the time of completing his course some information regarding the apprentice's training and future work is placed in his home-town paper and also in the shop newspaper.

Journeyman Starting Rate.—The starting rate of the graduate apprentice is determined by the record he makes during the course.

Follow-Up After Graduation.—Opportunities are provided for advancement to work of responsibility after completing the course. The careful placement and follow-up of graduate apprentices has proved to be one of the greatest aids in attracting the right type of boy to the course.

Scholarships.—As a war memorial the company provides a fund of \$8,000 each year to assist employees or sons of employees in securing a college education. Awards are made

on the basis of a competitive examination, which is open to trades apprentices as well as to other employees of the company.

Prizes.—The works executive committee, veterans' association, clerks' association and foremen's association each year contribute prizes for meritorious work.

Separate Department Responsible for Training

In the Westinghouse organization a separate department is charged with the responsibility of training a selected group of employees for the more responsible positions in the company. Functionally the work is divided between supervised shop experience and systematic instruction in the trades-apprentice school.

Boys sixteen years of age who have completed at least eight grades of grammar school, and who have developed a desire to learn a trade, were said to be most suitable for the training course. Boys are obtained through cooperation with the public schools from the families of the more substantial workmen in the organization and through general publicity. Each applicant is given a simple test in arithmetic, which was said to give a satisfactory indication of the mental ability and general aptitude for the work. A test is also given to ascertain the physical fitness for the work desired. The first six months of training constitute a probation period. If satisfactory, an agreement is entered into between the apprentice, his parents or guardian, and the company. The agreement calls for an apprentice wage scale which is based on the going rate for certain classes of skilled labor in the plant, this wage scale being subject to change, depending on the general wage level of the plant.

The total number of check employees at the East Pittsburgh plant of the company varies from 12,000 to 15,000. It requires approximately 300 apprentices, in training at all times, to supply the need for men with training of this kind. Apprentices are not laid off during slack periods, some boys being placed in training during such times in order to insure a continuous supply of trained men.

The work of the centralized training department and of the trades-apprentice school was outlined and data are given on instructors and the curriculum employed. Grading of the students was stressed, grades being said to be to the student what wages are to the regular workman. Careful grading is the basis for the application of incentives and is essential to successful carrying on of the work, said Mr. Coler. Therefore, a complete record of each apprentice is maintained throughout his course.

It was said that approximately 50 per cent of the apprentices who have completed their courses since 1908 are still in the employ of the Westinghouse company. Of these, 40 per cent are in supervisory work.

"Educational Training for Industry," a paper by Matthew Woll, vice-president of the American Federation of Labor, Washington, was presented in brief by R. L. Sackett, dean of the school of engineering, Pennsylvania State College, State College, Pa., chairman of the session. Written discussion of Mr. Woll's paper was presented by E. F. Du Brul, general manager of the National Machine Tool Builders' Association, Cincinnati, and Luther D. Burlingame, industrial superintendent, Brown & Sharpe Mfg. Co., Providence.

The New England Foundrymen's Association at its meeting, Dec. 8, at the Exchange Club, Boston, was addressed by D. M. Avey, editor of *Foundry*, and engaged in an open discussion of foundry costs. H. P. Blumenauer, president of the association, exhibited figures obtained from malleable foundries, all of which were asked to bid on a certain casting. Bids ranged from 8c. to 32c. a pound, while the actual cost of making the casting was approximately 15c.

The Compressed Gas Manufacturers' Association, 120 West Forty-second Street, New York, has published a directory of 64 pages and cover, giving a list of member companies with the products they manufacture and location of branch sales offices.

To Reduce Materials-Handling Cost

Direct Handling Cost Often Hidden in Other Items—
“Savings” May Take Many Forms, Including
Higher Sales Volume

TWO papers and a progress report were read before the Materials-Handling Division of the American Society of Mechanical Engineers in the Engineering Societies Building, New York, on Dec. 8. In both papers stress was laid rather upon the economic advantages of a properly coordinated system than upon its mechanical features. The latter, belonging properly to the province of design and modified by local conditions in each plant, is purely an engineering achievement. To save money on the operation, however, is a combination of engineering and management.

HAROLD V. COES, vice-president and general manager Belden Mfg. Co., Chicago, in his paper “Industry’s Annual Tax for Materials Handling and Suggestions for its Elimination,” estimated that the cost of handling materials can be reduced \$1,000,000,000 a year by utilizing equipment now available. This would include in many instances relocation of stock rooms and proper coordination of production with the equipment for moving materials.

Eliminating the Annual Tax for Handling Materials

His figure was predicated on the American manufacturing payroll of \$14,017,107,000 in 1923. Materials-handling labor was estimated, on the basis of a careful survey, at approximately 22 per cent of this amount, or \$3,084,000,000. He thought that at least one-third of this could be saved by installation of proper equipment, thus releasing many thousands of men from back-breaking, nerve-racking and fatiguing work.

If then the \$1,084,000,000 saved be invested in equipment, with an overhead for fixed charges and operating expenses of 33 per cent or \$361,000,000, the total overhead of industry for handling materials would be \$2,361,000,000 in place of \$3,084,000,000, while capital account would be increased by \$1,084,000,000. This investment would probably be paid for out of earnings, that is, net savings in labor expense, in from 4½ to 5 years.

Must Pay Huge Dividends

In his own practice, Mr. Coes stated that, unless a proposed handling device or change in equipment could be shown in advance to pay for itself through savings fast enough so that its cost could be amortized in 2½ years, no requisition for it would be honored. In some later cases, after the initial and most obvious equipment had been installed, this time was extended to five years. In any case, however, the idea was to get the investment written off before the equipment could be overtaken by obsolescence. There was no idea that it would wear out within that period.

“Because the greater portion of the materials-handling expense is usually buried in the expense payroll, and does not stare one in the face, this makes the revelations (as to possible savings), after a careful survey of all the factors, startling. A manager might not know, for instance, that his materials-handling costs per unit of product of 10c. might be reduced to 5c. or even 2c. in a concrete case. He might not know that this reduction can be obtained by a capital investment within reason.”

Profits come from high turnover and the elimination of waste. They are largely made through savings and not through making a wide divergence between sales price and initial cost of production. Exactness is essential in determining the actual factory cost of an article at the time of its production.

Referring to a basic equation for determining costs and savings in handling materials, Mr. Coes worked out his paper in accordance with that formula and showed definite figures for various pieces of equipment put into

his plant. His summation on this basis showed a yearly profit from the use of this equipment amounting to \$12,847, or 71.51 per cent of the cost, including installation, which was placed at \$19,611. The equation reads as follows:

$$V = [(S + T_s + U - E)X + T_f] - [Y + (KA)]$$

In this equation, which is taken from a paper read before the society at its Milwaukee meeting in May, 1925, by James A. Shepard and George E. Hagemann, the letters have the following meanings:

- V=Yearly profit in excess of simple interest, from operation of mechanical equipment;
- S=Yearly saving in direct cost of labor, in dollars;
- T_s=Yearly saving in labor burden, in dollars;
- U=Yearly saving or earning through increased production, in dollars;
- E=Yearly cost of power, supplies and other items consumed, total in dollars;
- X=Percentage of year during which equipment will be operated;
- T_f=Yearly fixed charges, in dollars, on mechanical equipment employed as a standard of comparison or which will be displaced;
- Y=Yearly cost to maintain mechanical equipment ready for operation (fixed charges);
- K=Unamortized value of equipment displaced, less its resale or scrap value;
- A=Percentage allowed on investment.

Proposed Installation Need Not Always Show Profit

Max Sklovsky, chief engineer Deere & Co., Moline, Ill., brought up the question as to the change over a period of a few years in the ratio between the cost of men handling material and the payroll for direct process work. It developed that this ratio is decreasing, because most of the savings made through installation of materials-handling equipment come in elimination of handling labor, resulting in having fewer men on the payroll for that class of work. Per unit of output, in a certain case, there was a decrease of 35 per cent in the total cost of labor on this account.

Mr. Sklovsky took issue with Mr. Coes in connection with requiring always a definite profit showing before authorizing expenditures for new equipment for handling materials. He stated that in his company, in a dozen or more plants, it is not at all uncommon for the management to take a chance on a saving, even though no direct saving can be figured.

Over a period of a dozen years of operation on this basis, he could not recall a single failure to obtain an adequate return upon the money so invested. He expressed the belief that indirect savings are far greater than direct savings and that savings in general from use of this equipment almost invariably outrun prognostications. By following up this policy his company has reduced the proportion of men handling material from 16 per cent of the total men working on processes to 2½ per cent.

Larger Output with Fewer Men

This same point of view was brought out by other speakers. J. C. Gillett, National Carbon Co., Cleveland, spoke of producing 36,000 dry-cell batteries per

9-hr. day before a carefully studied out conveying system was installed. After the installation the output from the same floor space was 65,000 units, with 6 per cent fewer operators. He attributed this gain largely to a uniform pacing of the work and secondarily to the fact that the operators were doing nothing but productive work, whereas previously they had shoved the trucks along the floor for a few feet to the next operation.

Some Savings Cannot Be Pre-Determined

Charles H. Bigelow, plant engineer Spicer Mfg. Corporation, South Plainfield, N. J., pointed out that many cases cannot be evaluated in dollars and cents when it comes to trying to make savings. In one case, where electric trucks had to be run across a railroad crossing, at a considerable expense for wear and tear, a smooth passage was made by concreting between the rails, with a big resultant saving which could not be measured ahead of realization. In another case, trucks were stored over night at one end of a platform, where they were subject to ice or other stormy conditions. Arrangements made to store them at the other end gave a considerable saving in maintenance cost, but one which could not have been figured accurately in advance.

Another speaker pointed out the reaction, on the sales end of the business, of having equipment for moving materials more smoothly. By delivering goods promptly better sales results are obtained and less money is tied up in material in process. At the same time the sales are turned more promptly into cash. He cited a case in a shoe factory where the time of delivery from receipt of an order was reduced from 21 days to 5 days, with consequent improvement in the work of the sales department and much more rapid collections on sales made.

Industrial Applications of Conveyor Systems

"INDUSTRIAL Applications of Conveyor Systems," was the subject of a paper by C. A. Burton, sales engineer Alvey Mfg. Co., New York. He stated that he was dealing with the largest of the intangible savings obtainable from material handling. He cautioned against any tendency to accept a materials-handling system of itself as a cure for the ills of modern manufacturing. On the other hand, many plant managers consider materials-handling equipment as merely an adjunct to manufacturing and not a component part of it. They look to it only when a situation places two adjacent operations at some distance from each other.

Four qualities of a commodity stand out as most important: It must be of the proper material; it must be of the proper shape; it must be at the place where needed and it must be at hand when needed. Materials-handling equipment has little to do with the creation of the first two qualities.

Utility of Place and of Time

Utility of place, however, is contributed almost entirely by such equipment, if we use the term in a broad sense. As to the utility of time, this means not merely placing the article at the point of ultimate consumption at the proper time, but placing it at various manufacturing operations when it should be there.

Proper synchronization of manufacturing operations is one of the most valuable functions of continuous conveying machinery. Mr. Burton gave a typical example by citing the laundry industry in its large modern plants. The sequence of operations in regular and rapid rotation is made possible through conveying machinery of various descriptions.

Max Sklovsky pointed out that much depends upon the positioning both of processing equipment and of departments. He told of a change made in one of his plants in which the product of weight of material moved, times distance moved, was reduced 45 per cent, merely by a rearrangement under both the above headings. In this case no handling devices were added. In another instance he had been able to reduce the travel of certain material from its entrance into the plant to the point of shipment from a total of 3100 ft. to 600 ft.,

at the same time reducing the number of different elevators on which this material traveled from eleven to two. He stated that the former case was not at all abnormal, but that it was commonly to be met in industry today.

Handling of materials between processes and between departments sometimes occupies 90 per cent of all the man-hours of labor in the plant, leaving only 10 per cent for processing. In some cases this handling figure is even higher. Analysis of it in the nine foundries operated by Deere & Co. showed 96 per cent of all human effort expended on handling of weights.

So important has this question of reducing muscular effort become that the old figure of 200 ft., inside which manual effort could be used to propel trucks, may be said to be entirely extinct. In the Deere plants trucks are not allowed to be pushed by hand a single foot. Another feature brought out was the importance of proper positions for the elevators carrying material from one floor to another. In one plant, where 16 elevators were so used, it was found possible, by making proper location and using proper types of elevators, to reduce the number to four.

Cost of Operating Trucks

Mr. Sklovsky gave some figures on the cost of operating a fleet of 40 storage-battery trucks. Placing the average life at four years, resulted in a 25 per cent depreciation item. Annual maintenance figured out at about 15 per cent of the initial cost and power at 10 per cent. Thus there is a total annual charge against each unit of 50 per cent of its cost. It is found, however, that the return on the investment made from savings in labor costs will amortize that investment in from 12 to 18 months.

One plant having 60 machines was operating them in such manner that the actual processing time figured out at about 30 per cent of the total time. By rearranging the same machines so that materials could be handled more adequately from the one to the next, this proportion of useful time was raised to 40 per cent.

McRea Parker, mechanical engineer Cleveland Worsted Mills Co., Cleveland, pointed out that the evaluation of time is the essence of the proposition in hand. In his plant, where piece work is almost universal, more work per hour was made possible by conveying equipment. This resulted in giving a greater return per annum on the fixed charges of building and machinery. Time in dyeing between the dye kettles and the drying equipment is important. By using conveyors, and saving some of the time which trucks formerly took, there was a reduction in the amount of spoilage in textiles of light shades. At various stages of the process, where it is important not to disturb the fibers, a conveying system means less handling and rehandling of the product, thus not only saving labor, but resulting in a better product.

Progress in Materials Handling

PROGRESS during 1926 was reviewed by James A. Shepard, vice-president Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., chairman of the Materials-Handling Division. There has been further improvement in the design of belt conveyors, which have extended their usefulness in the way of greater refinement in manufacturing by cooperating with various process machinery. Storage battery vehicles for inside use have been developed in which the capacity of the elevating type has been increased from 6000 lb. to 20,000 lb. An electric locomotive crane of 25 tons, operated by storage battery, has been installed, caterpillar-type locomotive cranes for construction work are being used and gasoline drive adopted on cranes as large as 25 tons.

Some of the most modern plants in many industries are designed around the materials-handling facilities. This is notable in the case of some of the latest foundries, but the principle has been extended to other fields as well. Car dumpers, cableways, automatic hoists and freight elevators were among other items discussed. In the case of the elevators, there have been no outstanding developments during the year.

Various Machine Shop Operations

Metal-Cutting Researches, Plastic Movement in Drawing, Chromium Plating, Worm Wheels and Belt Creep and Slip Discussed

THREE sessions of the annual meeting of the American Society of Mechanical Engineers in New York last week were devoted to machine shop practice. At these sessions a wide variety of topics came up for discussion, including elements of metal cutting, hardening properties of metals, chromium plating, varying viewpoints of machine shop operators, theory of milling cutters, worm wheels, behavior of metal in drawing, and belt creep and slip.

In several cases the papers were presented largely in abstract, and in two cases the presentation consisted primarily in describing the slides thrown on the screen. Most of the papers were discussed briefly by various engineers. The sharp limitation on time permitted, both for presentation of a paper and for the discussion, worked embarrassment to some of the speakers. In one or two instances discussions were only partly completed when they were chopped off short by the time limit.

Theory of Milling Cutters Developed Under Three Cases

PROF. N. N. SAWIN, research engineer Skoda Works, Pilsen, Czechoslovakia, submitted a paper on the "Theory of Milling Cutters." In his absence it was read by Prof. A. L. Jenkins of the University of Cincinnati. An attempt was made in the paper to find theoretical formulas for calculating the strength of mills and to determine their work. Most of the discussion on this paper centered around one of the assumptions made by Professor Sawin, which read as follows:

"The fundamental assumption on which the theory rests is that the normal component is equal to the tangential component; that is to say, $N = T$."

Professor Jenkins afterward explained that this sentence should more properly have read "The fundamental assumption on which the theory is applied. . . ." This particular phrase was attacked by five or six engineers, rising in discussion, as being untenable on the basis of what we know of the action of milling cutters and the forces which they have to overcome in their work.

Three Sets of Conditions Analyzed

In the development of the theory, three cases were examined. The first dealt with a plain cutter with straight teeth under conditions such that only one tooth was doing work. The second case dealt with a plain cutter with straight teeth (necessarily a larger number of teeth) such that several teeth were working simultaneously. The third case dealt with a cutter having spiral teeth. In addition, the theory was extended to cover end mills and to cover cutters with out-board arbor support.

The treatment was highly technical. The force operating was defined as proportional to the area of the cross-section of metal cut. Development of the bending moment and the torque on the cutter and on its spindle was followed by obtaining the equivalent bending moment for the whole unit. The shocks of the plain cutters were indicated as coming just prior to the end of the cut. With the single tooth in operation these shocks, of course, are accentuated.

In connection with the spiral tooth the axial component must be considered. This cutter, while it avoids the shocks of the plain tooth, is subject to a periodical variation in pressure between maximum and minimum. The cutting factor was evaluated in such form that for steel it became a constant, divided by the fourth root of the thickness of the chip. For cast iron of varying hardness it became a constant, divided by the third root of this thickness, the constant being adjusted separately for different hardnesses of material.

Unknown Forces Discussed

Among those discussing this paper in some detail were Joseph G. Berski, mechanical engineer Westinghouse Electric & Mfg. Co.; L. F. Denninger of the Cincinnati Milling Machine Co.; Prof. James A. Hall of Brown University, Providence, R. I.; A. L. DeLeeuw, consulting engineer, 149 Broadway, New York, and Rouvime Poliakov, mechanical engineer, New York.

In addition to the question of the relation between the normal and the tangential forces, it was stressed that there are many unknown factors entering into the determination of the forces which act upon milling cutters. Conditions vary with many variations in practice. The sharpness of the cutter makes a considerable difference, with the result that design of cutter arbors is now made on the basis of providing an arbor as stiff as possible, rather than one to meet a mathematically calculated strength requirement.

Professor Hall expressed the belief that any theory on cutter strength should rest upon the average horsepower put into the operation, rather than upon the maximum torque at the most strenuous part of the cycle. Most investigators who go into power in connection with the use of cutters are dependent upon measurement of that power as an average over the cycle, such as would be given by a watt-meter or by any form of dynamometer. These instructions integrate the power, but do not permit its measurement in detail over the successive phases of the cutting cycle.

Chromium Plating of Plug Gages Recommended

DR. WILLIAM BLUM, chemist United States Bureau of Standards, Washington, presented a paper of great interest on the subject of chromium plating of metals. His fundamental approach was as to the future of chromium plating, its practicality and its probable value when applied to engineering materials. This paper appears substantially in full on another page. The substance of the discussion is given below.

Replating After Stripping Old Plating

Many questions were asked the author by various speakers. Few had had experience with the process and all were avid for information.

In covering rapidly the subject matter of the questions, Doctor Blum said that it is difficult to replate with chromium over an old chromium surface. He

thought that this fact would be unimportant, because it is easy to remove the old surface merely by a 5-min. immersion of the article in a bath of hydrochloric acid. The chromium plating may then be replaced with fair certainty that there will be a uniform deposit, in place of what might be a spotty deposit, difficultly obtained, if the attempt were made to plate over the old surface without prior removal of the first layer.

Regarding the amount of deposit which it is possible to place upon a surface, Doctor Blum reported that he had obtained a thickness as high as 0.005 in. These thicker deposits, however, do not give so bright a surface as a deposit of 0.002 in., or less, or the 0.0002 in. used for certain high-grade work. As the deposit of material electrolytically results necessarily in a somewhat porous surface, it will be evident that the porosity will be greater, the greater the amount of such deposit.

He particularly stressed the fact that the chromium plating is an element of hardness as against abrasion, but has little or no effect against distortion of the base metal. That is, when a blow makes a dent in the metal, the thin chromium plating is not much of a protection to it.

Building Up New or Worn Plug Gages

One particular use of the process, which recommended itself highly to the audience, was in the finishing of plug gages. It was recommended that these

receive, before plating, all of the machining or grinding or lapping finish necessary. If then they are made definitely a minute amount under size, and this minute difference be made up by deposit of chromium electrolytically upon the surface, they may be finished in this manner well within the most stringent tolerance limits we now use. As these gages, thus prepared, gradually wear in service, they may be renewed by stripping off the old chromium surface, as described above, and replating to a definitely known extent.

Alan E. Flowers, engineer in charge of development, DeLaval Separator Co., Poughkeepsie, N. Y., referred to the gases in porous metal—whether occluded or not—as liable to go to the surface under any coating of metal as a plating, and to form blisters. If there is sufficient gas thus evolved the blister may break and release the pressure. Because of this fact he stated that adding any plating over another plating, itself perhaps somewhat porous, should be by means of a hot dip over a hot dip, rather than electrolytically.

Chromium plating was the subject of an article in *THE IRON AGE* of April 29 last, page 1187, where it was described as applied on a production basis in the Olds Motor Works for various automobile parts. Another article, page 599 of the issue of Sept. 2 last, laid particular stress upon the wearing qualities of the plated product. It was discussed in brief also on page 1012 of *THE IRON AGE* for April 3, 1924.

Plastic Behavior of Material in Drawing

METAL drawing, unlike many other classes of engineering work, has persisted mostly as an art rather than as a science. The empirical method has necessarily been the basis of advancement, due to limited knowledge of the scientific reasons for attending phenomena. C. L. Eksergian, research engineer in the laboratory of Edward G. Budd Mfg. Co., Philadelphia, presented a paper discussing the behavior of material in the process of drawing.

It was the purpose of the study to foster the development of analysis of drawing as an aid to subsequent development. No attempt was made to set forth any concrete analysis, as the subject is regarded as too complex, on the basis of present knowledge. An attempt was made, however, to outline a manner of attack by which proper conception of the phenomena may be realized. A general discussion was given of the manner of working the metal, with reference to its state and behavior in comparison with that found in drawing. A survey of the conditions observed in forming a stamping was made, along with a report of experimental investigations conducted by the author.

Analyzing Component Parts

Reactions set up in passing metal through the die were analyzed in some detail, while the circumferential strip straightened out was analyzed. Subject to compressive action, this strip would buckle if in the shape of a long column. The connection was traced between this condition and the friction between the blank holder and the die surfaces. Various forms of dies or punches

were considered and analysis of the forces acting was attempted.

One formula which was developed read as follows: $T = D + C + R$. In this case T is the tension in a strip of metal undergoing a drawing operation; D is the effect of drag from the blank pressure; C is the tensile component necessary to compress the blank circumference tangentially, and R is the resistance set up to travel over the die curvature. Since the tension in the wall is equal to the punch pressure when the wall is vertical, a record of the variation in punch pressure should indicate the resultant effect from a change in any one of the above-mentioned conditions.

This was made the subject of experimental test, resulting in curves showing the effect of a change in metal thickness on the final punch pressure.

Change Suggested in Tensile Test

In the discussion the use of the Ericksen cup test, in connection with metals, was questioned. C. F. Nagel of the Aluminum Co. of America, New Kensington, Pa., stated that it is the practice in his company to use the tensile test in these cases. The author of the paper spoke of the desirability of making use of two factors instead of one, in a tensile test. One factor would be the general extension over the length of a test piece of some considerable length—8 in. or more. The other factor would be the extension effect in the area of local necking of the material. If a combination of these two percentages were used in place of a single percentage, based on a gage length, results might be comparable.

Worm-Wheel Contact and Its Influence Upon Lubrication

EARLE BUCKINGHAM, associate professor of standardization and management, Massachusetts Institute of Technology, presented in abstract and mainly by means of lantern slides a paper on "Worm-Wheel Contact." He determined worm-wheel contact by analysis and traced the influence of the nature of contact upon lubrication. He analyzed three helicoids and gave equations for them:

A convolute helicoid had its generatrix tangent to a cylinder of any diameter concentric with the axis of the helicoid; a screw helicoid had its generatrix passing through the axis of the helicoid, being a limiting case of the former, with the base cylinder diameter zero; an involute helicoid had its generatrix tangent to a concentric cylinder of such diameter that the helix angle at this diameter was the same as the angle of

the generatrix with a plane perpendicular to the axis.

It was the object of the paper to show how any worm-wheel contact condition can be determined by analysis and to point out in particular the probable influence of the nature of the contact lines between a worm and a worm wheel upon conditions of lubrication, efficiency and load-carrying ability.

The conjugate action of racks was discussed and equations were given. The contact lines of screw helicoids used as worms were discussed, also contact lines of screw helicoids with large helix angles and involute helicoids with large helicoid angles.

Not a Recommended Practice

It may be noted that, while Professor Buckingham has used with success on two or three critical drives

the methods described in the paper, which was a preliminary report of the society's special research committee on worm gears, he presented it not as a recommended practice to be followed in design, but as a subject for further investigation.

In conclusion, he pointed out that the subject of worm-wheel contact is too large to be covered fully in a single paper. Study of the most favorable combinations of thread angles and helix angles would require a treatise in itself. An attempt was made in the paper to find a suitable "yard stick" to use in comparing data obtained from tests on various designs of worm drives.

Change of Viewpoint of Men in the Machine Shop

CONDITIONS of 30 years ago in the machine shop were contrasted with those of today by L. A. DeLeeuw, consulting engineer, New York. The new conditions have brought about a consideration of machine shop practice as a science based on art and not merely, as formerly, as an art.

Formerly the machine shop operative learned his trade largely through his finger tips and the muscles of his arms. He was what was known as a "practical" man. Anyone who deviated from the principles of the practical man was known as a "theorist" and was looked on with great suspicion. Neither the foreman nor any man under him knew the feed nor the speed of his machinery. The works manager himself usually did not know. Few of the men asked themselves "why?"

This may make it possible to reconcile seemingly contradictory data.

Several members discussed this paper, largely in the form of questions on details brought out by the speaker. A somewhat different phase of the problem was touched upon by Thomas W. A. Jeacock, president Buffalo Bronze Die Cast Corporation. He spoke primarily of the failure of gears in service and of the causes to which those failures were attributed. The primary causes were given as (1) the bronze or other material of which the gear was made, (2) the shape of the tooth and (3) the lubricant used.

or "why not?" with regard to the processes they were employing.

How the Change Came

With the introduction, however, of high-speed steel for tools and of motor drive for the machines, a change became imperative. Then the study of chips was undertaken and progress was made in machining operations and in the shape of tools. The speaker outlined the development of this progress up to the point where all the operations in a well ordered shop are under mechanical control and the practice has become a science.

He epitomized the changing condition as a turning away from the purely individual in practice to a practice developed upon well founded theory.

Progress in Machine Shop Practice Reported by Committee

WALTER F. DIXON, works manager Singer Mfg. Co., Elizabethport, N. J., and chairman of the executive committee of the machine shop practice division of the society, read the report of progress during the year. He pointed out that there was steady improvement in details rather than startling new inventions. "There is a growing demand for machinery which conserves the strength and time of the operator, as well as for such apparatus as dust-suction systems, conveyors, automatic chucks, etc. These are installed quite as often to lighten the operators' work as to cut down costs."

While progress in any one direction has been neither phenomenal nor radical, there is hardly a machine on the market which has not been improved in some way during the past year.

Motor-drive, as an integral part of machine design, was stressed in the report. Better bearings, including both ball and roller types, are coming into greater use. Lubrication is improving. Control is another impor-

tant branch of development. An increasing number of purely special machines shows another growing tendency. Hydraulic feeds have been utilized by several designers of new machinery. Precision measuring apparatus in production work has been greatly extended during the year, most of it utilizing optical multiplication of some sort.

Safety a Managerial Matter

At the beginning of the afternoon session on Dec. 9, Lew R. Palmer, safety engineer Equitable Life Assurance Society of the United States, and formerly safety engineer Jones & Laughlin Steel Co., Pittsburgh, told of the growing receptivity on the part of works managers to suggestions and appropriations for safety devices and education. However "hard boiled" a man might be in connection with tonnage, costs and other matters of plant administration, the question of safety has come to be regarded as of primary importance and deserving correspondingly of liberal encouragement.

Distribution of Belt Creep and Slip Analyzed

SEPARATION of the creep of a belt from its slip was the subject of a paper by Ralph F. Jones, research engineer Leather Belting Exchange Foundation, located at Sibley College, Cornell University, Ithaca, N. Y. The paper explains the stroboscope slip-meter used in the tests and the method followed in the investigation, as well as the theory involved. The results show that the arc over which the belt creeps starts at the last point of contact and extends in the direction opposite to rotation by an amount which depends upon the load.

An article by Mr. Jones, on page 708 of THE IRON AGE, March 5, 1925, covers some of the phases of the study he has undertaken. Another article, at page 481 of THE IRON AGE, Feb. 12, 1925, shows the method of obtaining a visual comparison of belt slip. It is this method which Mr. Jones used, with some modifications, in his present study.

When the arc of creep coincides with the arc of contact, true slip begins. The greatest amount of slip occurs always at the last point of contact, according to the author's findings. The amount of load which

can be carried by a given belt under given conditions at the merging point of slip and creep varies with the coefficient of friction.

Influence of Pulley Size Shown

If a small pulley is used with a larger one of the same material, the merging point will be reached first on the small pulley. Hence the greater portion of the total slip will take place on this pulley. Excessive slip may occur on the small pulley, while on the large one the belt is creeping below the merging point, with no slip whatever. It is probable that the merging point load is a function of the pulley diameter, as well as of the arc of contact and the coefficient of friction.

When the coefficient of friction does not appreciably increase with the rate of slip, the load which can be carried at the merging point is usually low. Excessive slip occurs when this loading limit is surpassed by a small amount. When the coefficient of friction increases with the slip, the merging point load will depend upon its value, other factors remaining constant.

Under these conditions much higher loads can be carried without extreme slip.

High Belt Speeds Discussed

Much of the discussion on this paper went into the question of belt speed. It has long been customary to consider a speed of 4500 or 5000 ft. per min. as that at which maximum power can be transmitted by a belt. Above that speed centrifugal action tends to decrease the quality of contact between belt and pulley, and hence to limit the amount of power transmittable.

Special cases were cited by various speakers, however, where belt speeds far higher than even the 9000 or 10,000 ft., formerly considered as the limit for transmission of any power, had been successfully used in transmitting a high power. One case was cited from Europe, where the power was continuously, though slowly, increasing, up to as high a belt speed as 21,000 ft. per min. Mr. Jones, in his closure, stated that experimental results, transmitting a goodly amount of power, had been carried up to 10,000 ft. per min. in his work.

Session Devoted to Metal-Cutting Researches

THREE fundamental researches in the field of metal cutting were presented at a session held Dec. 8 under the auspices of the machine-shop practice division and the research sub-committee on cutting and forming metals.

One paper was devoted to the results of an investigation conducted during the last three years at the University of Michigan, and was presented by O. W. Boston, associate professor of shop practice and director of engineering shops of that university. The title of the paper was "Research in the Elements of Metal Cutting."

The investigation was of a basic and scientific, rather than of a practical and applied nature. The problems undertaken in this investigation were as follows:

To determine the influence of the degree of sharpness of the cutting edge of the tool, the influence of the clearance back of the cutting edge of the tool, the influence of the front rake of the tool, the influence of side rake (skew) and the influence of the depth of cut or width of cut, respectively, as the variable, on the force on the tool or the energy required to remove a given volume of metal. It also sought to find a relation between the force on a tool of a given shape required to remove a specific chip of a given material and its physical or chemical properties.

A planer, equipped with a dynamometer of special design, was selected as the tool on which the work was to be done. All cutting tools were of the end-cutting type and were prepared for each problem in groups identical as to geometric form, heat treatment, grinding, etc., except for the single variable under consideration. The materials selected to be cut in the experiments were confined to those in most common use, which would give a wide range of physical characteristics. They included low, medium and high carbon steels; 3½ per cent nickel steels of high and low carbon, nickel-chromium steel; annealed and unannealed cast iron and brass. Cutting fluids were not used, and but one element was varied at a time.

The method of procedure and results of the investigation are described at length in the paper, each problem being treated individually. In presenting his conclusions, Mr. Boston pointed out that they were based only on the data presented in his paper and are not influenced by the work of other investigators. They are, however, compared in a succeeding section of his paper with the results of others. That this is an investigation of forces on the tool as a function of some one variable, rather than a study of tool endurance, was also stressed. Some of the results of the tests as summarized in the published abstract of the paper are as follows:

"The results show that the clearance angle has no influence on the force on the tool so long as the tool does not drag on the work, that the force on the tool remains constant for a wide variation of keenness of cutting edge and for thick chips, particularly, the tool edge may be rounded to 1/64 in. diameter without appreciable increase in the cutting force. It is also shown that the cutting force on the tool is reduced in direct proportion to the increase in front-rake angle, all other factors remaining constant. It is shown that thick chips are removed more efficiently than thin chips, and that narrow chips are removed more efficiently than wide chips. The results also indicate that there is an apparent relation between some of the physical properties of the metals and their machinability or the cutting

force on the tool for the carbon steels in one group, the alloy steels in a second group, and cast iron in a third group."

A bibliography of research in cutting tools and metal cutting is given in an appendix to the paper.

Investigations in Rough Turning High-Speed Tool and Structural Alloy Steels

TESTS made to extend to current commercial high-speed tool and structural alloy steels some of the empirical laws originally worked out by F. W. Taylor in rough turning carbon steels, were described in a paper on "Rough Turning with Particular Reference to the Steel Cut," by H. J. French, senior metallurgist, and T. G. Digges, assistant scientist, Bureau of Standards, Washington.

Taylor's lathe tests were made on carbon steels, representing the principal types then commercially machined, and with tools having a chemical composition somewhat different from that of current commercial high-speed steels. Today a variety of alloy steels are regularly rough turned and subjected to other cutting operations subsequent to heat treatments producing very high tensile strengths, which in some cases reach more than 190,000 lb. per sq. in. It is pointed out in the paper that, since there are differences of opinion regarding the machining properties of various structural alloy steels, it is important to study the effects of the metal cut upon the performance of modern high-speed-steel tools as well as to determine whether the fundamental relations developed by Taylor in cutting carbon steels apply also in rough turning alloy steels of high tensile strength and hardness.

The tests described in the paper were made on carbon and various alloy steels having definite tensile strengths within the range of 65,000 to 195,000 lb. per sq. in. (approximately 130 to 400 Brinell hardness). Tool performance as affected by the conditions of cutting (variations in material cut, cutting speed, feed and depth of cut) were studied; the form of the tool and its heat treatment were not varied. However, many of the tests with the customary high-tungsten, low-vanadium high-speed steels were repeated with other commercial types, thus permitting of variable cutting conditions.

Test methods and materials employed are described in the paper and the experimental results are given at length, graphical representation being employed extensively.

In the discussion the importance associated with problems of light cutting was stressed by several speakers, the hope being expressed that tests will be continued to throw light on machinability in that field.

Machinability Affected by Hardness Induced by Cutting Tool

"WORK-HARDENING Properties of Metals," a paper by Edward G. Herbert, Manchester, England, was presented in abstract at this session by J. Kaye Wood, consulting engineer, New York. It deals specifically with the additional hardness induced in metals by the action and work of the cutting tool.

The procedure employed in investigating the hardness induced by the tool in the process of cutting metal is described and illustrated in the first section of the paper. In this section it is shown that the cutting tool

hardens a ductile metal and that the actual separation of the chip takes place in a zone that has been so hardened. The capacity for being work-hardened is said to differ greatly in different metals.

A method of measuring work-hardening capacity by means of the pendulum hardness tester is outlined. Succeeding sections of the paper deal with chip formation, the built-up edge on cutting tools, temperatures generated in cutting metals; work hardening as affected by temperature, work-hardening changes and resistance to cutting, and work-hardening changes and the durability of cutting tools.

"In so far as the machinability of a metal depends

on hardness, it must therefore depend on the hardness induced by the tool and not on the original hardness," states Mr. Herbert in concluding his paper. Other conclusions are as follows:

"Cast iron, though capable of being hardened by cold work, is not appreciably hardened by a sharp cutting tool. Its work-hardening capacity is not generally a factor in its machinability, though it may be under special conditions. Other metals, such as brass, are intermediate between cast-iron and steel in respect to the plastic deformation and to work hardening caused by the tool, and in respect to the influence of their work-hardening capacity on their machinability."



Service Medals to Be Awarded to All Veteran Employees of the United States Steel Corporation



COMMEMORATING the twenty-fifth anniversary of the United States Steel Corporation, which was celebrated last April, the management recently decided to award silver and gold service medals to all employees, including executives, who have completed 25 years or more of service with the corporation and the companies out of which it was formed. The first of these presentations took place Tuesday evening, Dec. 7, at the Hotel Roosevelt, New York, as briefly referred to in THE IRON AGE of Dec. 9, when 38 of the staff of the parent organization at its New York offices, 71 Broadway, were the recipients of the medals.

Subsidiary companies within the near future will award medals to their own veteran employees. A census has been taken of all employees who have passed a quarter century of service, and while this may not be quite complete, it shows a total for the corporation and all subsidiary companies of 22,596. Of these 10,233 have served 25 years; 6200 have served 30 years; 3815 have 35 years to their credit; 1668, 40 years; 525, 45 years, and 157 have completed a half century of continuous employment. These, of course, include some who are on the pension list.

Silver medals are to be given to all who have been employed from 25 to 50 years, and those reaching the 50-year mark will receive gold medals. The medals are slightly larger than a half dollar, and on one side is the name, United States Steel Corporation, with the head of Judge E. H. Gary, chairman of the board, and a facsimile of his signature. On the reverse side is a symbolic group in bas relief typifying the dignity of labor. This side bears the inscription "25 Years of Service" or whatever the period may be.

Each year a new presentation of medals will take place. Those now receiving the 25-year award will in five years be eligible for the 30-year medal. However, the period of service is kept within the five-year classifications, so that a man who has now 29½ years to his credit still comes within the 25-year class, but by next year will be eligible for the 30-year award. James A. Farrell, president of the Steel Corporation, has completed 48 years of service, but will remain in the 45-year class for two years, when he will be eligible for the gold medal of a half century's work.

The affair at the Hotel Roosevelt, New York, Dec. 7, was a gala event in which most of the employees of the various executive departments of the corporation at 71 Broadway participated. Talks were made by Judge Gary, Mr. Farrell and former Governor Nathan L. Miller of New York, the corporation's general counsel. John V. Freeman was toastmaster.

Those to whom medals were awarded, with the approximate length of their service, are as follows:

45 Years	James A. Farrell	25 Years	Henry L. Austin
40 Years	David G. Kerr		James W. Bloomfield
	John Reis		James Cronin
35 Years	Elbert H. Gary		Alfred T. Duffield
	Eli N. Blinn		Gordon L. Edwards
	R. D. Little		William J. Filbert
30 Years	Charles S. Belsterling		James Fleming
	William A. Bush		Arthur J. Goff
	Charles L. Close		John Hulst
	William A. Forbes		E. W. Livermore
	Morgan Jones		W. J. Luhrs
	Fred T. Llewellyn		Charles MacVeagh
	John M. Sias		Clyde A. Mullen
	Adolph W. Vogt		Bayard Neilson
	Frank Parrish		George W. Norris
	George N. White		William J. Sullivan
	Philip Zwissler, Jr.		Fred W. Tucker
			Renzo J. Van den Heuvel
			William M. Walters
			Frederick W. Warner
			Arthur C. Zimmermann

Allied Industries of California Meet Next Month

SAN FRANCISCO, Dec. 10.—The third annual meeting of the Iron, Steel and Allied Industries of California will be held Jan. 20 to 22, 1927, at the Hotel Del Monte, Del Monte, Cal., under the auspices of the California Development Association and the San Francisco and Los Angeles Chambers of Commerce.

Group committees representing the mills, structural shops, bar jobbers, general manufacturers and foundries will meet separately in executive sessions Jan. 20 for preliminary discussions of the foreign steel situation, trade practices within the respective groups, and general problems affecting the relation of the individual groups to the organization as a whole. The general session of the conference will be opened Jan. 21.

The officers of the executive committee are: Maynard McFie, president W. T. McFie Supply Co., Los Angeles, chairman; John D. Fenstermacher, vice-president Columbia Steel Corporation, San Francisco, vice-chairman, and Charles S. Knight, manager industrial department, California Development Association, secretary.

The L. S. Starrett Co., Athol, Mass., maker of fine tools, will pay a Christmas bonus to its employees in the form of a percentage of the entire amount earned by each during the six months ending Dec. 31. The percentage is to be based on length of service and will range from 4 to 8 per cent.

Production Closely Controlled

Methods of Western Electric Co. Outlined at Joint A. S. M. E. and Taylor Society Meeting—Code of Management Laws and Review of Progress

AN outline of the principles of production control as applied in the manufacturing department of the Western Electric Co., Chicago, described by C. G. Stoll, vice-president and general manager of manufacture of the company, was one of the outstanding contributions to the management sessions held jointly by the management division of the American Society of Mechanical Engineers and the Taylor Society, Dec. 9, at the Engineering Societies Building, New York.

Notable also at the joint sessions was a paper formulating some 40 laws of manufacturing management, and a report of the progress being made in management engineering.

These sessions formed part of the program of both the annual meeting of the A. S. M. E. and of the meeting of the Taylor Society. The latter meeting, held Dec. 8-11, comprised a complete program.

Organization Is Along Functional Lines

The comprehensive scope of the production control problem of Mr. Stoll's company is indicated in the following data: The manufacturing organization of the company operates a plant which employs more than 30,000 people, occupies over 3,000,000 sq. ft. of floor space and produces over \$150,000,000 worth of manufactured product annually. All of the well-known mechanical operations are employed, as well as those peculiar to the rolling of copper rod and drawing copper wire, the manufacture of ceramic products, paints, varnishes and japans required for special purposes. Some 13,000 kinds of apparatus, requiring over 110,000 different parts, are manufactured.

The manufacturing organization is set up along functional lines, each major class of work being performed by a separate organization. There are seven major organizations, the duties of which are for the most part as follows:

Engineer of Manufacture (commonly called Manufacturing Planning).—Devises and furnishes complete plans for all the operations of manufacture and provides the equipment required. It carries the responsibility for keeping the works abreast of the developments in the art of manufacture.

Production Branch.—Receives and analyzes all orders for product and determines monthly requirements in terms of apparatus, component parts and raw materials. Orders and receives stocks of raw materials. This branch also determines the manufacturing intervals, and issues work orders and schedules to the operating departments. It follows the movement of products and, among other duties, it counts the product and gives official credit for work performed. All warehousing, trucking and transfer work is done by this department.

Technical Branch.—Receives plan of manufacture and equipment from engineer of manufacture and applies them to the factory. Provides factory with manufacturing instructions in the form of layouts, which specify each operation, the tools and machines, speeds, containers in which parts are to be handled, the amount of raw material to be used and departments to which the parts shall be routed. It establishes piece-work rates and also acts as works landlord, operating the power plant and service systems, maintaining the grounds and buildings and supervising watch and fire protection service.

Industrial Relations Branch.—Handles employment and looks after general welfare of employees.

Operating Branch.—Comprises all of the departments actually engaged in the operation of machines and handling of productive labor in manufacturing the product.

Inspection Branch.—Responsible for quality of product, from receipt of raw material through each process operation to the final inspection of the completed apparatus.

Clerical Branch.—Sets up the clerical system under which the works shall operate, prescribes routines, computes the payroll, pays the help and the bills for materials and supplies. It also compiles costs.

Each of these organizations is complete in itself, having its own superintendent and staff.

In the arrangement of plant equipment, the method most extensively followed is the segregation of machinery and equipment according to class of work. The specialized departments in buildings of the multi-storied type are arranged so that the work progresses vertically, from the raw material storerooms and heavy machine departments to the assembly work and part storerooms on the top floors.

Manufacture of Products Carefully Planned

Among the planning functions of the engineering for manufacture organization is accurate estimating of the cost of a proposed product, determining the method of manufacturing to be employed and providing the machinery and tools. The forecast of the cost of manufacturing reveals whether the contemplated design is practical from a manufacturing standpoint, how the capacity of the existing plant will be affected, and how large an investment in new plant and equipment will be required. This estimate is based on the use of data previously compiled in the form of standards.

Analysis of the design of each new product is also made in advance of its manufacture and features which would prove troublesome in the factory are eliminated. Study of design frequently leads to changes which will contribute to more economical manufacture, and it may be found that the article may be simplified, different material more advantageously used, etc. After a design has been approved manufacturing drawings, stock lists, and test sheets, etc., are prepared.

Analysis of operations required to produce a part or piece of apparatus, and the most logical and economical sequence of operations, is also made by the planning organization. This manufacturing analysis prescribes the tools and machines to be used, machine feeds and speeds and the kind and quantity of material to be drawn from the storerooms, which information is sent to the technical branch, which issues a manufacturing layout. The latter serves as a complete instruction for the manufacture of the part. When the manufacturing analysis is made, construction or purchase orders are originated for all the tools, machinery, and equipment required, these orders being forwarded to the tool and machine department.

Forecast of Probable Manufacturing Activity Compiled

The setting up of a forward picture of the probable manufacturing activity by the scheduling organization is a feature of the production control system. This forecast, compiled semi-annually, is based on the orders on hand, past requirements and future indications, and is expressed in terms of the major lines of product. These product requirements are later broken down into individual parts in order to present a picture of the probable future of the various manufacturing departments. This estimate also provides a basis for a general survey of raw material needs and is used in compiling advance raw material requirements for use in contract or quantity buying.

Although the semi-annual estimate does not authorize manufacture and is subject to revision, it is said to assist materially in maintenance of an even shop-load. It also permits changes in the production program to be made economically.

The task of scheduling the work, it was pointed out, requires close analysis of two fundamental considerations, the process time allowance and the distribution of load. Accurate estimates of process time allowances are based on records. The large variety of products made by the company presents perhaps every

known type of scheduling problem. The control of this problem requires careful analysis of each order received, the maintenance of adequate process allowance records and a definite "fitting" of each new order into the general production program.

Definite authorizations for the manufacture of each major type of apparatus are issued monthly. As they are derived from a number of sources, the summarization of all the monthly requirements on any one item would ordinarily present a complicated and expensive task, but by means of a mechanical tabulating system, the speed and accuracy of this work has been markedly increased. Summarization of component part requirements is also facilitated by the mechanical tabulating system.

Stock Maintenance With Small Personnel

Methods of maintaining stocks of materials, parts and finished products were outlined, and it was stated that although the ordering and stock maintenance involves control of 100,000 separate items, these functions are controlled with a relatively small personnel. This is accomplished by reducing the necessary clerical operations to a simplified form and establishing routines, formulas and methods which will, as much as possible, function automatically.

A tracing system is maintained to assure the delivery of parts and apparatus in accordance with schedules, and to control investment. The department that operates this system also has the responsibility of seeing that all necessary steps are taken to insure the successful carrying out of the production program. The operation of this system was interestingly described.

The work of the inspection department was outlined. An interesting phase of this work is the extensive use of equipment and methods whereby unskilled and semi-skilled employees are able to make intricate and difficult tests. Means are provided so that the trends and results of inspection work can be visualized. Methods of counting material and parts after each operation to determine piece work wage due operators, and the counting required in receiving and delivering materials from stores, were also described.

Expense Budget a Feature of Cost Control

Control of investment through the stock record system was touched on and control of the elements of costs discussed. The latter control is exercised by means of reports or charts showing the trend of cost levels, instead of detailed costs of production, which are regarded as being historical and fragmentary in statistical value. Of the three elements of costs, labor is largely controlled by conducting the manufacturing operations on piece work, and control of material is through the manufacturing layout referred to above. Expense is distributed into the cost of the product itself by loading rates and for the purpose of control, a detail departmental budget is used.

The underlying principles of this expense budget as well as data relating to its operation and the benefits were dealt with at some length by Mr. Stoll. A unique plan for obtaining costs has been developed. This cost system is set up so that expenditures inherent in an article are associated directly with that article, and from what is known as the basic cost, while expenditures common to a group of articles of the same general class, such as extra cost of overtime, higher cost due to less experienced operators, etc., are prorated over the individual basic cost. This is accomplished by means of blanket orders, details of which were given.

To his interesting description of the means of control of many of the major functions of the manufacturing department of his company, Mr. Stoll, in closing, rounded out the picture with an outline of a series of reports which bring together the results of these diversified activities. A complete picture of operating results is obtained from a number of reports, called shop statistics reports. This group is made up of three reports: an annual "Budget of Shop Statistics," issued Dec. 1 for the ensuing year; a "Shop Statistics Report," issued monthly, showing actual results and cumulative for the year, and the "Forecast of Shop Statistics," issued three times a year, based on figures available at

the end of April, July and October. Each of these reports was described and illustrated.

The fact that the practice of a large corporation bore out so many of the principles enunciated by Taylor was commented on by R. T. Kent, consulting engineer, New York, in discussing Mr. Stoll's paper. Mr. Kent stressed the importance of scheduling, saying that without vision of what one wants to do and how to do it, forms and routine would not bring good management. It was also pointed out that the details of management that would apply to the conditions of one company might prove disastrous to another company. In developing a production control system, it was necessary to get a vision of one's own conditions, rather than making a blind copy of what another has done, said Mr. Kent. Percy S. Brown, Portable Adding Machine Co., Chicago, spoke of Mr. Stoll's exposition of the production control system as an outstanding example of the engineering approach to management.

Formulates Some of the Laws of Management

"Laws of Manufacturing Management," a paper by L. P. Alford, vice-president of the Ronald Press Co., New York, presented at the first management session, Dec. 9, was designated as an important contribution to the literature of management science.

Although principles of management were discussed at length during the early years of the modern movement for improved manufacturing operation and control, this discussion did not yield a body of fundamentals to become commonly accepted and applied, said Mr. Alford. In this respect, it was stated, management is still at the starting point, although the codification of methods and practice, which has taken place in recent years, points anew to the existence of ascertainable fundamentals. Steady accumulation of evidence points toward the establishment of management as a science, and the very complexity of its applications indicates the existence of many rather than a few fundamentals, the speaker said.

Among the advantages to be derived from a body of management regulatives is that when once reduced to codified form these laws may be taught to all students in engineering schools who wish to prepare for executive and managerial positions. They may be consciously applied in everyday managerial and operating activities.

Mr. Alford's paper is an investigation of the whole general question. It advances a theory as to the origin of management fundamentals, and in the second part of the paper a number of fundamentals are formulated in uniform language, and their importance and extent of application are supported by citations from recognized leaders in management and other scientific pursuits. He expressed the hope that further investigation would be made, which in time will establish the laws of management as securely as the laws of mathematics, physics and chemistry.

More than 40 laws are formulated under some 25 headings. Some of the laws given are as follows:

Law of Standardization.—Fixing the types, sizes, and characteristics of product reduces the cost of its manufacture. Corollary: Interchangeable manufacture reduces manufacturing cost and, all other characteristics being equal, produces a product of maximum serviceability.

Law of Responsibility and Authority.—Responsibility for the execution of work must be accompanied by the authority to control and direct the means for doing the work.

Law of Leadership.—Wise leadership is more essential to successful operation than extensive organization or perfect equipment.

Law of Exceptions.—Managerial efficiency is greatly increased by concentrating managerial attention solely upon those executive matters which are variations from routine, plan or standard.

Laws of the Task and the Wage Incentive.—1. The average worker accomplishes most when assigned a definite amount of work to be done in a given time. 2. An adequate wage incentive for the accomplishment of a definite task influences a workman to maintain his maximum output.

Laws of Material Control.—1. The highest efficiency in the utilization of materials is obtained by producing the required quantity, of the required quality and condition, at the required time and place. 2. The highest efficiency in the storage of materials, tools and supplies is obtained by providing a definite place to store every item, keeping every item in its assigned place, and keeping adequate record thereof.

Law of Wage Rates.—Wage rates on standardized jobs

should never be changed except a material change has previously been made in conditions, methods or equipment.

Law of Economic Lot Size.—The quantity of product that can be manufactured at the lowest unit cost varies directly as the square root of the preparation costs and inversely as the square root of the interest charge and storage charge.

Other laws given in the paper relate to specialization; economic production; production control, planning, plant maintenance; quality control and inspection; wages; hours of work; acquiring skill; hand motions in doing work; motion time; delay allowances; manufacturing costs; profit; flow of work; discrimination (preferred numbers); and economy of labor-saving equipment. Additions and modifications of the laws as given were suggested in the discussion, changes in the laws of specialization being mentioned by several speakers.

Progress in Management Engineering

Progress in management engineering was outlined in a report contributed by the management division of the A. S. M. E., the chairman of which is C. W. Lytle, instructor of industrial engineering, New York University, New York.

"The tendency of manufacturers to employ their own engineers to carry out the details of management has resulted in a distinct cessation of controversy and of prejudice against scientific management," says the report. "In fact, the principles of scientific management have spread much more widely under these conditions than ever before. For instance, the principle of preplanning in the form of budgeting is now universally accepted and is accomplishing great benefit. In the type of industry which has always employed engineers, present progress is taking the form of minor refinement rather than of innovation. Distribution, which has had less attention than production, is now being studied by many engineers.

"While America is securing some foreign trade of the mass-production type, Europe and especially Germany is taking the bulk of that which involves small-lot manufacture," states the report in the section devoted to markets. "Our own Southern districts are developing rapidly and are demanding both capital and experience in management. The typical American company is carrying lower inventories. . . . By using the order-point principle, purchasing agents are getting a more rapid turnover of money with less waste of material."

Regarding organization, it is stated that coordination and integration of functions is more thoroughly attended to than formerly. The education and development of personnel is being given greater consideration, and most large corporations now have educational departments.

High wages and high production have brought about more favorable labor relations here than in other countries, states the report. Part of the report of the *Daily Mail Trade Union Mission to the United States* is quoted, and it is said that this mission is to be followed by a governmental mission representing the employer and consumer as well as the employee. In regard to safety it is pointed out that while employee committees have done much to secure cooperation in safety work, it is becoming apparent that the management must take the responsibility. There is said to be a need for the standardization of safety statistics. Elimination of fatigue is said to have had more propaganda than research. In a general way conditions have improved and unnecessary fatigue has been lessened. The tendency toward a wider division of operations permits of a closer study of methods, but there has been practically no advance in our knowledge of the nature of fatigue and the part it plays in efficient production.

Interest In Financial Incentives

There is said to have been a revival of interest in the subject of financial incentives. "Literature is again becoming voluminous, but of a more analytical and constructive type," states the report. "Group bonus has become more common, especially in the automobile industry. Some of the early applications of this plan were merely short cuts toward standardization of per-

formance, and involved considerable injustice. These dangers are becoming known and are being successfully avoided. The prejudice which formerly existed against piece work has lessened, as such rates have been guaranteed, and employees are learning that piece rate gives them all the wages saved from decreased time."

Successive sections of the report take up simplified practice, engineering education and economics. In a section on psychology it is observed that the practical manager and the theoretical psychologist have been getting together. There is promise of much better placement of personnel than heretofore. The fear that narrow specialization would be unwelcome or harmful to employees is subsiding under the circumstances of short hours, high pay and excellent working conditions. It is stated that the employee in America is treated better psychologically than in Europe.

Improvement in the attitude of manufacturers toward research is commented upon, and it is said that there is need for a great deal of pure scientific research in the immediate future.

Advantages in Decentralization

Concentration of administrative functions burdens the principal executives with details, stunting their growth and curtailing the development of subordinates, said R. E. Newcomb, superintendent, Deane Works, Worthington Pump & Machinery Corporation, Holyoke, Mass., in a paper on "Vitalizing vs. Centralizing Organizations," presented at the second joint management session Dec. 9.

"The delegation of responsibilities," he continued, "tests and seasons the lower ranks for new and added responsibilities. Concentration removes the executives from the local contacts necessary to qualify for the proper administration of local functions."

"Well-distributed authority vitalizes with liberty of decision and freedom of initiative and action," continued Mr. Newcomb, in another part. "Concentration of administration with its devitalizing red tape is not harmonious with a sound code of management. The administrative function is to coordinate, deputize details, and vitalized scientific management follows as a natural consequence of appreciating that an organization is individualistic and human."

Production Control Applied to Coal Mine Industry

The successful installation of centralized production control in coal mines of the Davis Coal & Coke Co. was interestingly described by J. C. White, editorial staff, *Coal Age*, New York, in a paper on "An Experiment in Scientific Management in the Coal Mine Industry." It was concluded that this industry can adopt scientific management to advantage, particularly where mechanical loading is making progress. Attention to details rather than principles has held back the application of scientific management in this industry, it was stated. In the discussion of the paper, Wallace Clark, consulting engineer, New York, described briefly the application of scientific management in several coal mines in Poland.

In a paper on "Railroad Organization," J. C. Clark, Industrial Relations Counsellors, Inc., New York, outlined a few of the fundamental differences that distinguish the railroad industry, and described the characteristics of the organization that conducts railroad business. Methods of organization were outlined and the coordinating of the work of the various departments was briefly discussed.

International Interest In Scientific Management

The international scope of scientific management was emphasized at a joint session with the American Management Association, the Committee on American Participation in International Management Congresses, the management division of the A. S. M. E., the Society of Industrial Engineers and the Taylor Society, held on the evening of Dec. 9.

In the principal address of the evening Harold B. Butler, deputy director International Labor Office, Geneva, Switzerland, explained the need for international cooperation in the development of a science of manage-

ment. He told of the formation of the International Labor Office as a part of the machinery of the League of Nations and briefly cited its development during the last seven years. The need of a clearing house for labor disputes of international character has been recognized by the League as a potential agency for the promotion of good will in the world, as Mr. Butler pointed out, and there is little doubt that the science of management will become an important social factor; in fact it has already been recognized as such by Mr. Butler and his associates.

Stanislav Spacek, secretary of the International Committee of Scientific Management, Prague, Czechoslovakia, who is in this country in order to secure American cooperation in the next International Scientific Management Congress to be held at Milan, Italy, in 1927, explained the work of the organization which he represents and outlined briefly its plans for the future. Others who contributed to the meeting were Conrad d'Angelo, consulting engineer, Paris, France; W. H. O'Neil Manning, National Institute of Industrial Psychology, London, England; C. H. van der Leeuw, vice-president International Association for the Study and Improvement of Human Relations and Conditions in Industry, Rotterdam, Holland, and Irene M. Witte, a contributor to management literature, Berlin, Germany.

Taylor Society Program Comprehensive

In addition to the joint meetings reported above, the Taylor Society held five sessions, at which some seven papers were presented and discussed. There was also a symposium for teachers of management and an open forum dinner meeting.

Special sessions for teachers of management occupied the first day, Dec. 8. The importance of scientific research in management was clearly defined by Dr. H. S. Person, managing director of the Taylor Society, at the first session, Dec. 10, which was given over to a study of the methods and instruments of research. Dr. Person emphasized the need for imagination in the undertaking of research problems, and went on to explain the use of research as an aid in establishing operating procedures, in making managerial decisions and in the general development of a science of management.

An interesting experiment in cooperative management by a group of diversified industries is the Massachusetts Manufacturers' Research Association, founded five years ago largely through the efforts of Henry S. Dennison, president Dennison Mfg. Co., Framingham, Mass. The scope and achievements of this organization were outlined in some detail by Raymond L. Tweedy, its secretary. In the group are 11 companies, all manufacturers of different products, and an educational institution, the heads of which have been meeting at regular intervals for the purpose of comparing various common problems. This organization, Mr. Tweedy pointed out, is no longer an experiment, but an established contribution to the science of cooperative management in the solving of common industrial problems. In a brief discussion of Mr. Tweedy's paper, Henry S. Dennison explained that the convincing proof of the association's basis upon fact and not theory is the actual financial saving enjoyed by its members.

Overhead Costs Discussed

"Overhead Costs and Managerial Policy," a paper in the field of economics, was presented by Prof. J. M. Clark, Columbia University, New York, at a session devoted to "phases of managerial policy."

Unabsorbed burden, or the cost of idleness, as he preferred to term it, was taken up by Wallace Clark, consulting management engineer, New York, in his discussion of Professor Clark's paper.

"In my work," said Mr. Clark, "I find that the facts in regard to this cost of idleness provide the most effective information for the determination of manufacturing and merchandising policies."

It was held that the methods of cost recording which will give this information can be made far more simple than the usual methods which do not furnish

these data. A method of recording this cost was outlined as follows:

"Past records of expense and plans for the future are studied, and the overhead expense of the plant, kept ready for work, is predetermined.

"Material which is standing on the floor of the shop is not affected in any way by that shop; it is only when machines are applied to the material that any value is added to it (with machines I would include tools, hand operations, applications of heat, electric current, etc.). Therefore, the plant costs can be applied to the material through the machines—that is, the overhead of the shop is distributed to the machine in the form of a machine hourly expense rate, which we usually refer to as the idle rate, for that is the cost of keeping the machine ready to run. When it does run, there is the added cost of power, supplies and other expense due to the actual operation of the machine. This is added to the idle rate, and the result is the running rate.

"By means of these machine rates the entire overhead of the plant is each day distributed either to production orders by means of running rates, or to certain idleness accounts by means of idle machine rates. These idleness accounts do not merely represent unabsorbed expense, but are built up accurately and are subdivided according to the reasons for the idleness. In a typical machine shop these accounts are as follows: Lack of help, lack of material, lack of power, lack of tools, repairs, lack of orders.

"These costs of idleness due to repairs, lack of tools, etc., are usually reduced as soon as they come to the attention of the management. Idleness expense due to lack of orders provides a basis for determining sales and pricing policies. For instance, in a plant where the product is made to order, the raising and lowering of prices would depend on the amount of work ahead of the plant, because that forecasts the probable losses due to idleness of equipment."

Some newer relationships in the functions of administration were discussed by Miss M. P. Follett, New York, who spoke at this session on "Leadership and the Illusion of Final Authority." A younger member's session, held Dec. 11, was a feature as heretofore, the paper this year being on "The Problems of Staff Men in Industry," by A. B. Rich, Dennison Mfg. Co., Framingham, Mass.

Hand-to-Mouth Buying

An evening session was devoted to current or "hand-to-mouth" buying, which is regarded as a new major problem of management. A paper on the subject, under the title of "The Influence of the Current Buying Habit on Managerial Policy and Practices," was contributed by W. O. Jelleme, comptroller of the Cohn-Hall-Marx Co., New York. Ways of meeting the new condition were suggested in the paper, which referred for the most part to the textile industry. Discussion dealt largely with the practice in the textile, shoe and leather, and clothing industries.

New Officers of Taylor Society

Morris L. Cooke, consulting engineer, Philadelphia, was elected president, and C. L. Barnum, comptroller of the American Radiator Co., New York, will serve as vice-president. E. W. Clark, 3rd, E. W. Clark & Co., Philadelphia, continues as treasurer.

Griffin Company Buys Ohio Plants

The Standard Car Wheel Co., Cleveland, has sold its plant and business to the Griffin Wheel Co., Chicago, which will operate it as one of its carwheel manufacturing units. No change, at least for the present, will be made in the executive personnel of the Cleveland plant, which will remain under the management of H. S. Sherman, president and treasurer of the Standard Car Wheel Co. The Griffin company has also acquired the carwheel foundry that is being erected by the St. Bernard Mfg. Co., St. Bernard, Ohio, a suburb of Cincinnati, having purchased the stock of the company from H. S. Sherman, the sole owner.

Development in Coal Utilization

Low-Temperature Carbonization and Some of Its Features—Metallurgical Coke Properties for Blast Furnace Use

BY DR. CECIL H. LANDER*

SCIENTIFIC problems of the carbonization of coal are so multitudinous that only a brief summary of certain salient features can be attempted. Certain definite principles have been followed in the development of the processes now undergoing technical and commercial exploitation. These are incorporated in the following types of units:

1. Vertical retorts without mechanical agitation of the charge.
2. Vertical retorts with mechanical agitation or movement of the charge.
3. Inclined retorts with or without mechanical disturbance of the coal by means of breakers, scrapers, etc.
4. Horizontal retorts with mechanical movement of the charge and agitation.

The method of heating the coal in the several processes may be by one or more methods: (1) External heating; (2) internal heating, or (3) a combination of the two.

Low-Temperature Carbonization

The methods of treatment may be divided into two classes, depending upon the form in which the solid product of carbonization is obtained. The products of carbonization are smokeless fuel, low-temperature tar and gas of high calorific value. It does not seem probable that ammonia will be obtained in sufficient quantities to warrant its recovery.

In plants in which the solid product is obtained in the form of lumps it is usually necessary for the charge of coal to be stationary for a sufficiently long period for it to have time to agglomerate. This effect may, however, be brought about by introducing the coal into the retort in such a compact form that it retains this form throughout the carbonization, or by subjecting it to compression during the carbonization process. It is necessary to place some little emphasis on these conditions, since in processes in which they are not adhered to a large percentage of coke breeze may be produced, with a corresponding diminution in the commercial value of a smokeless fuel.

Investigations have been carried out under the direction of the British Fuel Research Board which indicate that, if the mass undergoing carbonization is too compact, considerable loss of the tar occurs. If, however, coal of greater size than $\frac{1}{2}$ in. is used the yield of oil is increased. In processes which do not aim at the production of a lump fuel the coal may be carbonized in a finely divided condition and be kept in motion either by means of a revolving retort, by plows or by allowing it to enter a heated retort in a pulverized form. Such methods of treatment increase the yield of tar, while the solid product is suitable for use as pulverized fuel after further grinding. It may, on the other hand, be converted into briquets suitable for general industrial purposes.

How the Plants Are Made

It is of interest to examine for a moment the materials of which plants for low-temperature carbonization should be constructed. For production of a robust, smokeless fuel a temperature of carbonization of at least 600 deg. C. is required, unless pressure be applied while the material is in the plastic state. In many suggested processes temperatures of 625 to 650 deg. C.

are used, and it is recognized that this is a critical temperature for the normal types of cast iron available in commerce.

Should these temperatures be exceeded, the rate of deterioration of the cast iron is excessive. The use of steels and semi-steels has been suggested, but the problems of construction are by no means simple, and the initial cost may be very great. Many of the difficulties do not arise in plants in which the aim is other than the production of lump smokeless fuel; in these cases the temperature may be maintained at such a level as to give a maximum yield of oil, which is lower than that usually required for the production of a coked solid product.

In the development of any process from the laboratory stage to that of commercial operation four distinct stages must be passed through:

1—The process must be worked out on the laboratory bench, using quantities which may be measured in grams.

2—An intermediate-scale unit is erected with a view to obtaining further designing data for a still larger unit. In this stage the plant will probably deal with several hundredweights per day.

3—A full-scale unit is erected and tried out. The size of this unit would depend upon the type of plant and might range between, say, 5 tons and 100 tons daily capacity.

4—A commercial battery consisting of several units similar to those which have been developed in stage 3 would be erected in a favorable locality, so that the money-making capacity of the system could be tested by commercial audit.

It of course often happens that one or more of the stages are omitted, but this involves an element of gambling in which the odds are frequently heavily against the promoters. In the past much damage has been done to the cause of low-temperature carbonization by the omission of either stage 3 or stage 4, and plants of large size have been erected without a proper recognition of the factors involved, so that failure was almost inevitable.

There are several processes of low-temperature carbonization in which the work is being carried out on sound lines. Most of these may be said to have reached the end of stage 2. One or two are approaching the end of stage 3. None have yet reached the end of stage 4, where they can produce audited figures showing actual profit made from a plant working under normal commercial conditions.

As Carried Out in England

The stages may be illustrated by the work which has been carried out during the past seven years at the British Fuel Research Station. A method of low-temperature assay is used in which 20 grams of the coal to be used can be carbonized in a silica tube, the products, coke, tar, ammonia and gas, being carefully measured. In this apparatus it is possible to determine the properties of a coal or a blend of coals with respect to low-temperature carbonization.

In the intermediate-scale type of apparatus, which comes under stage 2, the original battery consisted of nine horizontal steel retorts, each 9 ft. long, $2\frac{1}{2}$ ft. wide and about 6 in. high. The coal is carbonized in trays, each tray being the full width of the retort and 3 in. deep. The vapors are led through a gas connection at the back of the retort, and complete condensing system and recovery plant are installed.

The plant now in operation consists of two simple cast iron vertical retorts each 21 ft. high, the internal dimensions being 7 in. by 6 ft. 6 in. at the top, tapering to 11 in. by 6 ft. 10 in. at the bottom. These are

*Director of Fuels Research, Department of Scientific and Industrial Research, London, England. This is a selected portion of Doctor Lander's Robert Henry Thurston lecture, delivered before the American Society of Mechanical Engineers in New York on Tuesday afternoon, Dec. 7.

inclosed in a simple brick setting and heated by gas, either coal gas or blue water gas being used. Although producer gas would probably be used in practice, it is not used in the experimental retorts, on account of the necessity for accurate measurement of the amount of heat supplied to the setting.

It has been found that these retorts work excellently with a sized, non-swelling coal, giving good tar yields, and a robust easy-burning coke without an undue proportion of breeze. It has also been found that easy working and good yields can be obtained from a sized or screened coal of the swelling variety, but that if fine coal is charged to the retorts, or "run of mine" coal containing fine coal, the tar yield falls off considerably, and the throughput of the setting is reduced. The throughput of coal treated under the best conditions is 7 to 8 tons a day for the setting, and the temperature of the wall of the retort is kept as close as possible to 625 deg. C. (1157 deg. Fahr.), care being taken to prevent local overheating. The setting in question has been under heat since December, 1925.

The method of working is to run the extractor for a few minutes at regular intervals of 1 or 2 hr., thus

contains a considerable proportion of benzene, toluene, xylene, and naphthalene compounds, which are essential for the manufacture of dyes and explosives. This type of tar also yields a high percentage of pitch when it is distilled. The pitch is, however, a valuable product for many purposes, of which the most important is road making.

The above mentioned chemical compounds are absent from low-temperature tar, while the amount of pitch formed on distillation is much less than with high-temperature tars.

It is clear that new uses must be discovered for low-temperature tar and for the products which may be separated from it. The present trend of thought appears to be that its chief value will be as a fuel, although the large percentage of phenols it contains may find applications in the chemical industry.

Some divergence of opinion exists among chemists as to the temperature of carbonization at which tar possessing the most valuable qualities is obtained. There appears some reason to suppose that each type of plant may modify in some characteristic manner the composition of the tar produced from a particular

What the Thurston Lectures Represent

"To the memory of Robert Henry Thurston, first president of the society and for years its inspirational leader," says the program, "the society pays tribute in the form of annual lectures, the first of which was given at the 1925 annual meeting. The Robert Henry Thurston lectures will deal with subjects in the zone between engineering and science and will present the latest knowledge in the field in which Doctor Thurston was so notable a pioneer." For the 18 years preceding his sudden death in 1903, Doctor Thurston was director and dean of Sibley College, Cornell University.

dropping the level of the coke in the retort, which is then filled up with coal and left quiescent until the next charging period. Steam amounting to 10 to 20 per cent of the weight of coal is admitted to the base of the retorts.

It appears likely that this system is approaching the end of stage 3. When we are satisfied that that goal has been reached, arrangements will be made for a commercial battery to be installed under suitable conditions, to carry its development to the end of stage 4.

Low-Temperature Coke

Study of the behavior of different coals carbonized at the temperatures usually associated with low-temperature carbonization, 600 to 700 deg. C., has thrown much light on the influences which determine the physical structure and the chemical properties of the resulting smokeless fuel. The sponge-like structure results from simultaneous melting and evolution of gas, which takes place mainly between 350 and 700 deg. C. It may be accepted that the ultimate structure of the material is mainly determined by the treatment which it receives at this stage.

Coherency of coke can be shown to depend largely upon the presence of certain substances which, on carbonization, act as cementing materials to other constituents. If this binding material is in excess, foaming may occur. This may be prevented in various ways, such as by confining the coal and so rendering it impossible for it to expand, or by subjecting it to a preheating treatment or to oxidation, which destroys some of the binding material. One of the most direct and economical methods is to provide, by blending with non-caking coal or coke, a sufficient amount of inert matter which will absorb and so utilize the excess binder resulting from the swelling coal.

Low-Temperature Tar

Tar produced during low-temperature carbonization differs essentially from that obtained when coal is heated to a high temperature. High-temperature tar

coal, and each of the types of plant previously mentioned produces a different amount of oil from the coal.

Investigation Made

To examine this important question a detailed investigation was started some years ago to inquire into the various aspects of its application to British coals. The results can here be only summarized. For details a paper by my associates Sinnatt, King and Linnel, which will be published shortly in the *Journal of the Society of Chemical Industry*, can be consulted. In the investigation a typical British coal was carbonized at a series of temperatures ranging from 400 to 700 deg. C. in 50-deg. intervals. Sufficient tar was obtained at each of the temperatures to permit detailed examination, and Table I contains a number of the chief values obtained.

Metallurgical Coke

During the last few years special attention has been paid to the technique of coke production with the object of obtaining a clearer insight into the conditions prevailing in a coke oven during normal operation. Foxwell investigated the duration of the plastic state, the path of travel of the gases in an oven, and their influence upon the products of carbonization. He determined the resistance to the passage of the gas of the coal before carbonization, when the plastic state occurred, and after coking.

From his results he was able to suggest that in a coke oven, owing to the relatively high resistance of the plastic mass, the gases first evolved tend to pass inward to the center of the oven. The path taken by the gases may be controlled to some extent by the size and coking properties of the coal used. The amount of decomposition of the gaseous products will depend on their path of travel, and thus the yield of products can be varied by an alteration in the conditions of working.

Foxwell also investigated the "plastic curves," obtained with coking and non-coking coals, work which is

(Continued on page 1742)

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Statistical Data Concerning the Chief Consuming Industries Indicate That:

1. Demand for iron and steel is already downward, and a considerable period of slowly declining trend lies ahead.

2. Railroad traffic has passed its peak without any general shortage of equipment.

3. New building projects are sharply off in floor space and sales have declined in building materials.

4. October automobile production

showed a heavy drop; some seasonal recovery may come in early spring.

5. Oil and mining industries have been taking increased quantities of steel.

6. Agricultural consumption has been hit by low prices of farm products.

7. General manufacturing was sharply curtailed in October, for the first time, at this season, since 1921.

STEEL production is being adjusted to a declining demand. This important fact appears clearly in the first chart. Curtailment is not a pleasant process, but in the present state of trade it is the part of wisdom, and recent developments speak well for the soundness of the steel industry. There is no such excess production of steel ingots as existed in 1923, when the output continued to increase for some months after declining activity in steel-consuming industries had indicated a reduced demand.

The trend of activity in the chief iron and steel-consuming industries turned sharply downward in October. In fact, the decline was the sharpest since that which occurred last January. It is noteworthy that *this is the first time on our record that such a decline has occurred at this season*. Certain abnormalities now existing, notably the unusual volume of coal traffic, may affect our November index of the composite demand, but it is believed that a considerable period of generally declining trend lies ahead.

Decline in Demand and in Ingot Production

INGOT production, the figures being so adjusted as to eliminate the usual seasonal ups and downs, has declined for three months in succession. In other words, August was the true peak of the year. Was it also the peak of the current business cycle as reflected in the steel industry? It is yet too early to draw that conclusion with certainty, but it begins to seem probable.

The decline in ingot production keeps the steel curve a little below the composite demand line. It seems fair to say that the production of semi-finished steel is in close adjustment with the potential demand for that

product, and, unless industrial activity falls off more sharply than now seems likely, there is no reason to anticipate any large decline in steel prices. The manufacturers' profits will suffer from reduced volume, but as long as demand and supply continue in good balance reasonable price structures can be maintained.

A period of cautious and hesitant buying lies ahead—during the next month or two. Steel consumers know that there is practically no possibility of an advance in prices and, as the business outlook is uncertain, to say the least, they will keep inventories at a minimum and do little forward buying.

Conditions in Specific Fields

Allowing for merely seasonal variations, which are very marked in this case, *railroad freight traffic* showed a downward trend in October. This is the more marked because of the heavy coal traffic. In fact, the activity of bituminous coal producers has been so abnormal of late that the November freight tonnage figure will probably not decline so much as usual for the season. Now that Lake traffic has closed, however, and the English coal strike is over, this factor will soon cease to affect the tonnage figures.

There is no car shortage, and the orders for new freight cars are relatively small. Even locomotive orders are but fair. We see no prospect that the equipment business will be sufficiently large to prevent further decline in steel sales.

The *building* industry will be discussed below. It is sufficient here to note that the broad trend appears to be downward, and that this condition is reflected in a reduced volume of lettings of structural steel and in relatively small sales of certain kinds of pipe, while

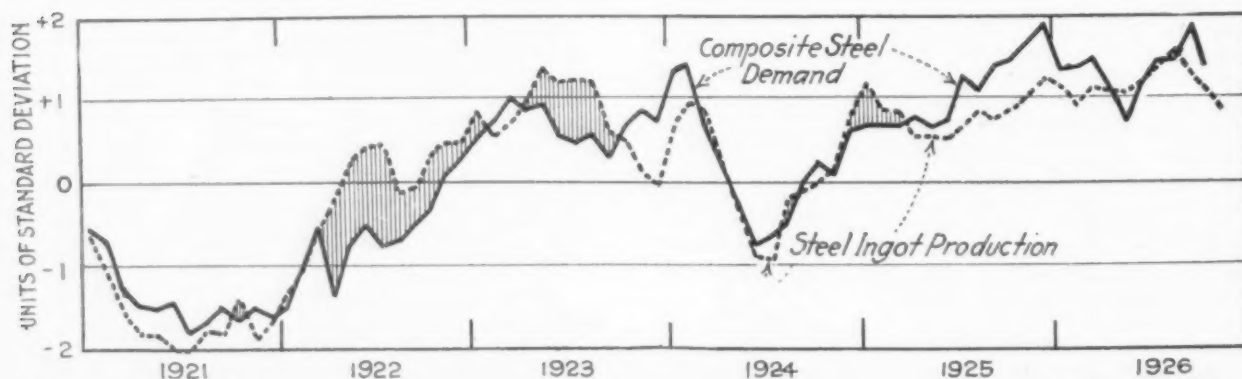


Fig. 1—Steel Production, with Figures Adjusted for Seasonal Variations, Has Been Declining for Three Months. It appears no longer to be in excess of the demand

In This Issue

Will not buy new equipment unless it will pay for itself within five years or less.—Before honoring buying requisitions the Belden Mfg. Co. tests the proposed purchase by the five-year rule. But other manufacturers assert they get best results by acting upon faith, backed up by careful consideration of all factors involved.—Page 1690.

Finds 96 per cent of all human effort expended in foundries is in handling weights.—Analysis of work in nine foundries of Deere & Co. indicate that major savings can be made in industry generally by the substitution of mechanical for manual handling.—Page 1692.

Belt slip occurs chiefly at the last point of contact.—When the arc of creep coincides with the arc of contact, true slip begins.—Page 1695.

Keeness of the tool has little effect on cutting efficiency.—Dynamometer tests on planer reveal that the force on the tool remains the same over a wide variation in keenness. Edge may even be rounded 1/64-in. in diameter without appreciably increasing the cutting force.—Page 1696.

Semi-annual forecast of manufacturing activity assists in maintaining an even shopload.—Western Electric Co. also finds that it provides a basis for surveying raw material requirements.—Page 1698.

Get accurate data on the cost of machine idleness and you will find a way to reduce it.—Manufacturing and merchandising policies can be determined most intelligently when the cost of idleness is revealed.—Page 1701.

Forecasts a period of cautious and hesitant buying.—With practically no possibility of price advances, and an uncertain business outlook, steel buyers will keep inventories at a minimum, says Dr. Haney.—Page 1704.

In gray iron foundry cost estimating, a 2.5 ratio of general expense to direct labor is rarely accurate.—Applies only to a narrow range of work. Factor can be computed without much difficulty.—Page 1682.

Chromium-plating power cost may be five to ten times that in nickel-plating.—Baths containing chromic acid are low in "throwing power." To secure maximum rust resistance in plated steel articles, chromium-plating works excellently when applied over nickel- or copper-plating.—Page 1687.

Estimates industry can save one billion dollars a year by full utilization of material-handling equipment now available.—Figure is based on the assumption that 22 per cent of the manufacturing payroll is for handling of materials.—Page 1691.

The cutting tool "work-hardens" the metal.—And the actual separation of the chip takes place in a zone so hardened. Therefore, the original hardness is not a safe factor to use in calculating machinability.—Page 1697.

Sharp decline in general manufacturing activity in October was the first October decline since 1921, economist points out.—Believes that this suggests a lower level of operations for the coming year.—Page 1707.

Billet-piercing costs can be cut by using two mandrels.—Time now lost in stripping the mandrel of its tube can be saved by swinging duplex mandrel into position, so that a new billet may be pierced during the stripping operation.—Page 1683.

Half the apprentices trained remain in the company's employ, Westinghouse finds.—And of these, 40 per cent are in supervisory work. Gaps in a force of 12,000 to 15,000 workers are filled by a school of 300 apprentices.—Page 1690.

This will be a record year in steel ingot production.—Gain over 1925 will be about 7 per cent. Oddly, the indications are that electric steel will show a decline.—Page 1715.

By refusing to handle its own problems, business forces the Government to cope with them, says Hoover.—Extension of Federal activities is the direct result of "passing the buck" to Washington.—Page 1738.

CONTENTS

December 16, 1926

Fixing Costs for Gray Iron Castings	1681
Chromium Plating Is Expanding	1685
Copper and Brass Manufacture	1688
To Reduce Materials-Handling Cost	1691
Various Machine Shop Operations	1693
Production Closely Controlled	1698
Development in Coal Utilization	1702

To Canvass World Trade Movement....	1684
Standardization of Motor Frames.....	1687
Trades Training	1690
Service Medals for Veteran Employees..	1697
Credit Is Dominant Economic Factor....	1709
Votes Down Tax Reduction.....	1710
Carnegie Safety Trophy.....	1711
Large Ingot Mold Cast.....	1715
Favors Buying for Three-Month Periods.	1735
Trying to Unionize New England Foundry	1735
Bethlehem Honors H. E. Lewis.....	1737
Business Puts Government in Business..	1738
Metric Bill Up Again.....	1741
Bureau of Standards Celebrates Quarter- Centennial	1741
Wholesale Prices 1890 to 1925.....	1743

STATISTICAL

Steel Corporation Unfilled Orders.....	1711
Bituminous Production	1735
Building Construction Continues.....	1743
Electric Industrial Trucks Shipped.....	1743
More Tin Plate Made.....	1744

MEETINGS

American Foundrymen's Association....	1687
Iron and Steel Industries of California..	1697
American Society of Mechanical Engi- neers....	1690, 1691, 1693, 1698, 1702, 1709
American Mining Congress.....	1711

NEW EQUIPMENT

Billet-Piercing Mill Manipulator.....	1683
---------------------------------------	------

DEPARTMENTS

Business Analysis and Forecast.....	1704
Editorial	1712
Iron and Steel Markets.....	1716
Comparison of Prices.....	1717
Prices, Raw and Finished Products.....	1719-1721
Structural Awards and Projects.....	1733
Non-Ferrous Metals.....	1734
Personals	1736
Obituary	1737
European Steel Markets.....	1739
Machinery Markets.....	1745

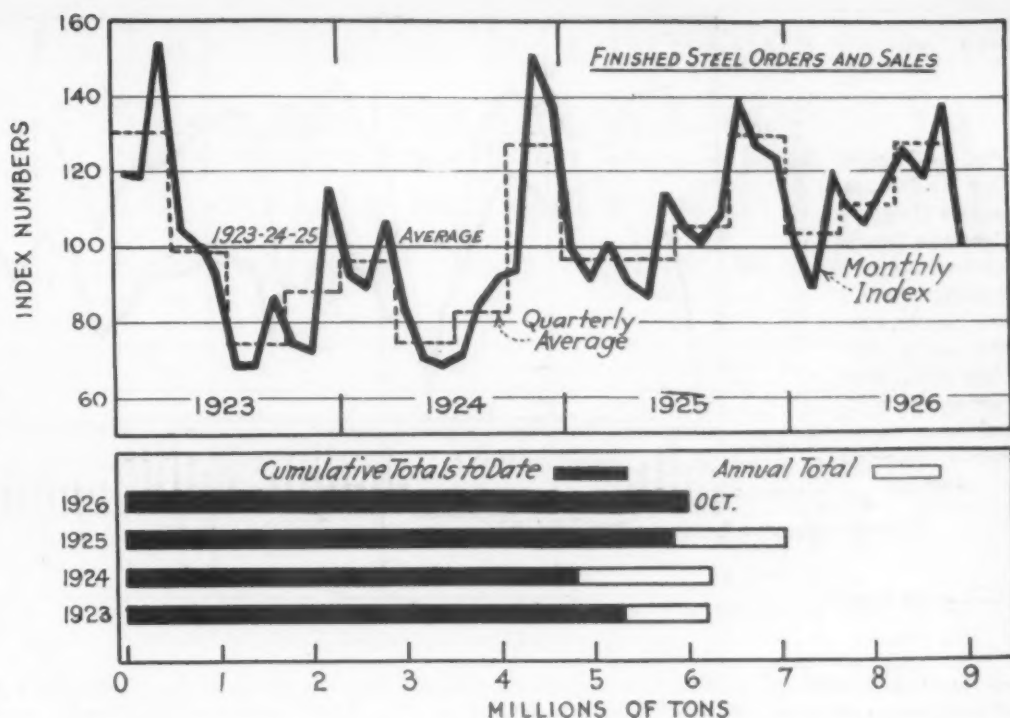
News and History

MANY events in a year's business have an important place in the news of a given industry, but taken separately they do not constitute history. Only when they are considered in the light of their relation to the broad trends of the industry as a whole do these events achieve historical importance.

No publication can really illustrate this significance as events are recorded from week to week. THE IRON AGE recognizes this fact by the publication on the first Thursday of each January of an issue which attempts to interpret the happenings of the year in their true historical position. The annual survey and statistical number is of great value in orienting progress and thus providing the basis for future action.

For News Summary See Reverse Side

Fig. 2—Finished Steel Orders and Sales Reached a Peak in September, Which Was the Highest September in Any Recent Year. October showed a sharp curtailment. The cumulative total for the first ten months is larger than for any recent like period



competition among the producers is reported to be keen.

Automobile production fell off to an extraordinary extent in October, and further seasonal declines may be expected to show in the reports for November and December. Some seasonal recovery is to be expected early in the year, but we believe the 1927 outlook to be less favorable than the 1926 actuality has been.

Excluding those industries which are treated separately, we find that general manufacturing industry declined sharply in October, after allowing for seasonal influences. This is the first time that an October decline has occurred since 1921. The volume of manufacturing in October was little under the average of the last two years and was, therefore, large, but our studies show that the broad trend is no longer upward, and suggest a lower level for the coming year. In this connection, machine-tool orders in October failed to show the usual seasonal gain and, according to weekly reports, it is apparent that November business fell off fully as much as usual. Buyers are evidently showing great hesitation and, as machine-tool orders are closely related to manufacturing activity, it seems probable that they are due to decline during the next few months.

Coal and Oil Maintain Upward Trend

On the other hand, the trend of the mining and oil group of industries has been upward, led by bituminous

coal and petroleum. Production of copper and anthracite coal has been well sustained also. Rigs and drills continue to show the expansion of oil development that has gone on during most of 1926, and in October indicated an activity about equal to that of the spring peak in 1923. Oil production has rather steadily increased, and it appears probable that 1926 production will be at least equal to that of 1925. Naturally the demand for storage tank material and oil well supplies has been good, and is likely to continue so for some months yet. Bituminous coal production, however, is clearly becoming excessive, and already prices have weakened and wage reductions have been compelled. The price structure in the oil industry has been weakened and refiners' margins are low. Thus it does not seem probable that these strong spots in the demand situation can be maintained much longer.

The farmers of the country are hardly in a position to furnish any large market for iron and steel products. Agricultural prices are the lowest, in comparison with manufactured commodities, in more than two years. The Government has estimated that the income of the farmers from the chief crops will this year be about \$400,000,000 less than in 1925.

Not much is to be said about the export outlook for steel. October exports declined, but that is usual for the month, and the figure made a somewhat better showing than that for October, 1925. Nevertheless,

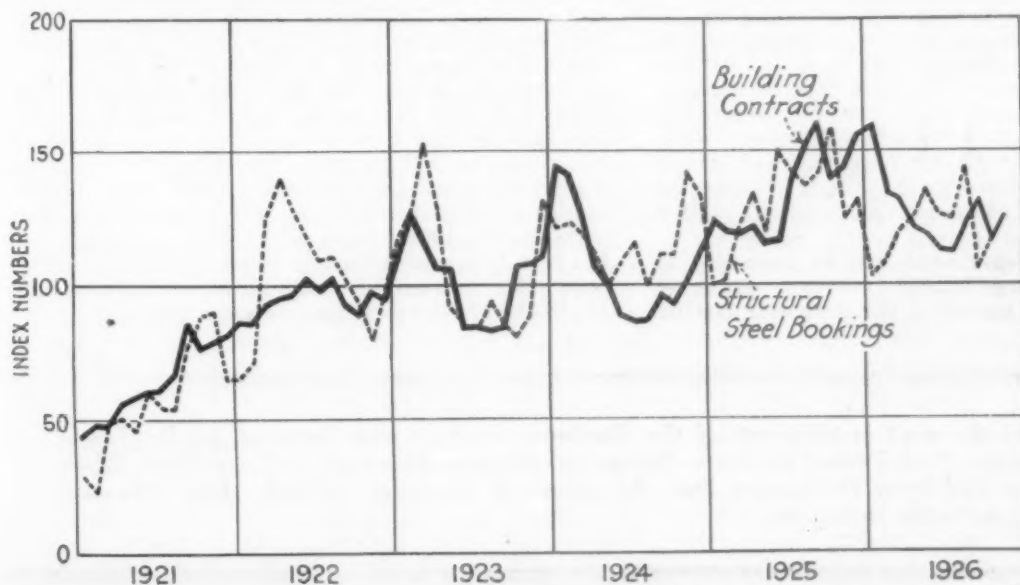
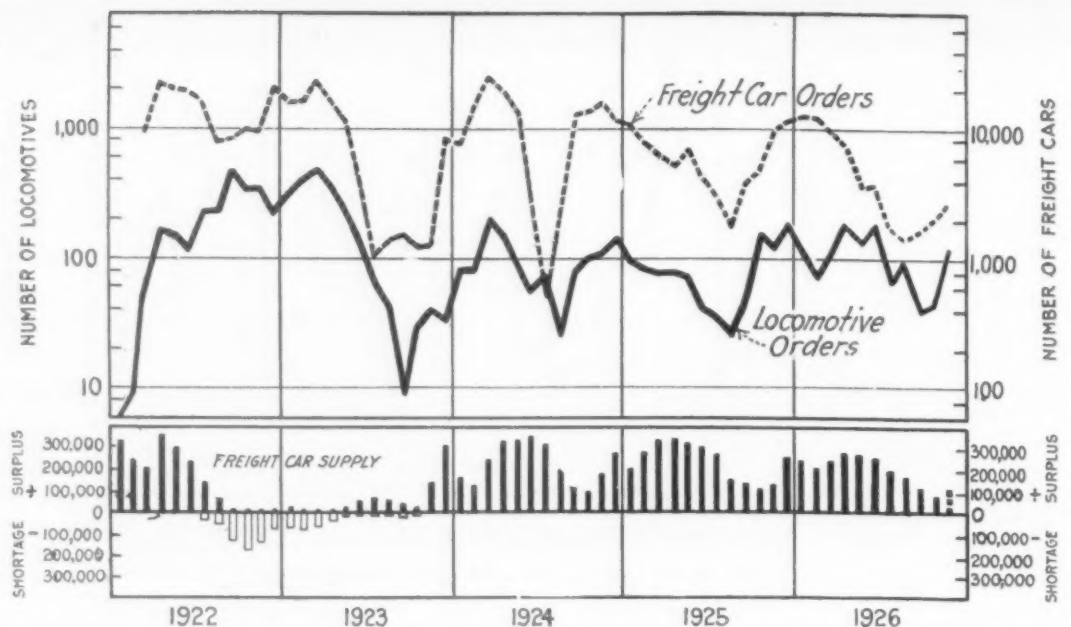


Fig. 3—Building Contracts Have Fallen Off Sharply. Indications point to a lower level in 1927 both in building floor areas and in structural steel bookings

Fig. 4—Freight Car and Locomotive Orders Continue Disappointingly Small. Orders are lower, for the season, than since 1923. Both curves are plotted as a three-month moving average



we continue to hold the opinion that our foreign sales of steel and steel products are likely to sag, and can lend little support to the domestic market, in view of increased competition from foreign producers.

Sharp Downward Movement in Finished Steel

AS appears in the second chart, finished steel sales make a different showing this year, when compared with a year ago. The total volume for the third quarter was not much under that of the same period in 1925, but note the October trend. In October, 1925, our index of finished steel sales was 138.8 per cent of the four-year average; this year the index is only a fraction above 100 per cent. Last year finished steel sales increased sharply in October; this year they decreased as sharply. Here, again, we find a case in which the record shows that no such sharp downward movement has occurred at this season in recent years.

As a result, the cumulative total sales for the first ten months of the year have begun to lose their lead over the same period of 1925. It now seems probable that 1926 sales of finished steel will hardly equal the total for 1925. According to present indications it seems that this year will furnish the first case since 1921, at least, that the fourth-quarter sales have not been above those for the third quarter. In 1924 and in 1925 the fourth-quarter business was the highest of any quarter in the year.

Sheets Particularly Sensitive

The chief item in the weakness shown a month ago is found in sheets, the orders for that product being 50 per cent smaller than in the preceding month. October structural lettings, too, while larger than in September, were far below the last year, and indicate a general declining trend. We note that the Government figures for the month were somewhat larger than the weekly reports on the lettings had indicated. While November weekly lettings, therefore, averaged around 25,900 tons, against about 21,000 tons in October, we hesitate to conclude that the monthly total will show a proportional increase.

Readers of this department will be interested to note how closely, during the last two years, our curve of finished steel sales resembles the composite demand

line in the first chart. This is a striking confirmation of the validity of the theory upon which the latter is constructed.

Building in 1927 Will Not Equal 1925 or 1926

FACTS as to building contracts and structural steel sales are illustrated in the third chart. The floor space in new building contracts was off sharply in October and was far below a year ago. The index used makes due allowance for the merely seasonal variations. No such allowance is made in the structural steel curve and the reported increase in October is shown without adjustment. The index, however, is also far below the same month of 1925.

Notwithstanding a slight increase in the adjusted index of contracts during November, it is our opinion that the trend of building activity is downward. We note that the trend of new business enterprises was decidedly downward in November, which is often barometric of building trends. The value of contemplated construction also decreased in November. Money is not tight, but it certainly is not easy. In view of the apparently adequate supply of building that now exists, it seems improbable that 1927 will see such a volume of building or structural steel bookings as existed in 1925 or even in 1926.

Low Level of Railroad Equipment Buying

FREIGHT car business continues at a level that must be disappointing to the steel makers. Orders in the last three months were the lowest for that period since 1923. In November, 2730 freight cars were ordered, against 2891 in October, and 13,598 a year ago. There has been unusually little pick-up in freight car buying this fall, as is shown by the trend of the curve.

Locomotive buying has improved a little and makes a better showing than in the case of freight cars. The last three months have shown about the same volume of business as in 1925, and a little better than in 1924. November orders for locomotives (215), with the exception of December last year (216), were the largest since March, 1924. Here, too, however, the fall rise has been late, and it must be remembered that unfilled orders for locomotives of all kinds totalled only 517 at the end of November against 535 a year ago.

Schedule of the next installments of the *Business Analysis and Forecast*, by Dr. Lewis H. Haney, Director New York University Bureau of Business Research, follows: Dec. 23—Position of Iron and Steel Producers; Dec. 30—General Business Outlook; Jan. 13—Activity in Steel-Consuming Industries.

Credit Is Dominant Economic Factor

As Remedy for Social Ills, It Stabilizes Prices Here
and Revives Trade Abroad, Says Dewey—Thrift
Is By-Product of Installment Buying

THE release of mechanical power was the outstanding economic factor in the last century. The expansion of credit facilities will be regarded by future historians as the most important economic influence of the first third of this century, in the belief of Dr. Davis Rich Dewey, who delivered the Henry Robinson Towne lecture Dec. 9, at the annual meeting of the American Society of Mechanical Engineers, held at the Engineering Societies Building, New York. Doctor Dewey, who is identified with the Department of Economics, Massachusetts Institute of Technology, Cambridge, Mass., spoke on the topic, "The Credit Factor in the Structure of Industry."

"Why should we conclude that credit is a more characteristic feature of the present era than it has been in the past?" asked the speaker. "The justification for this lies in the recent enormous expansion of credit, penetrating into every nook and cranny of our economic life; the creation of intricate machinery for distributing credit over wide areas, separating the debtor and creditor by thousands of miles; and the application of credit as an agency to remedy social ills."

As a remedy for social ills, credit is being used to stabilize prices, as well as to prime the well of foreign trade, he said. Installment buying, one of the most freely discussed forms of the extension of credit, may prove fully capable of running the gauntlet of business reaction. Moreover, an important by-product of installment buying is thrift. One of the most noteworthy phases of the expansion of credit, in Doctor Dewey's opinion, is the increasing responsibility it places on the engineering profession. Investment circulars would carry much more weight with the buying public if they contained signed statements by the engineers who investigate the physical properties of the enterprises seeking capital.

Three-Fourths of Automobiles Sold on Credit

While admitting that installment buying has not yet undergone the acid test, Doctor Dewey pointed out that this form of credit may be nevertheless well founded. He said, in part:

"Installment buying is another example of credit. It is not new, for real estate, farms, houses and furniture for many years have been bought on the partial-payment or installment plan. Its extension to an everwidening list of commodities has aroused much discussion. Three-fourths of the automobiles are sold on credit, and installment buying now includes radio sets, phonographs, washing machines, refrigerators and clothing. It is estimated that the amount of sales of installment goods during the past year was over six billion dollars. A very considerable part of these credits was advanced by finance companies, specially organized for this purpose, and these in turn obtain credit from banking institutions. We have here an illustration of credit employed to stimulate consumption. Of course, if consumption is increased, production also will be increased. But credit is here put, on a large scale, to a use to which we have not been accustomed. It is probably too early to test the soundness of these credits. Although some are apprehensive that they will not stand the shock of a business depression, if one should occur, others believe that the bulk of these credits has been managed in an orderly manner and is as well founded as the more familiar credits to producers. . . .

"Such buying (installment buying) may be imprudent and show poor judgment, but it is a step in the development of the credit relationships under orderly procedure and supervised management. Well organized credit facilities make for thrift. . . . It

(thrift) has its origin in the desire for a future and enduring satisfaction rather than an immediate, temporary and perishable satisfaction. It is, therefore, possible that this recent development of credit relationships involved in installment buying may have thrift as a by-product. It is said that \$500,000,000 are annually deposited in banks by Christmas clubs; 25 per cent of this, however, is not withdrawn for the purpose originally designed but is left in the investment. So we see thrift is a by-product."

Credit Goes to Rescue of Cotton

To illustrate the importance of credit as an economic remedy, Doctor Dewey called attention to measures that have been recently taken in the South.

"The time-honored method of clearing the competitive market of surplus goods and equalizing supply and demand has been by adjustments in price. The use of credit as a substitute for price reduction is becoming more frequent. A striking illustration of this is occupying the stage at the present time in the South. An unexpectedly large yield of cotton has lowered its price below the cost of production for a portion of the crop. Loss naturally results. To check the decline in price and prevent greater loss, credit has been called to the rescue. Cotton will be withdrawn from the market and stored under control of banking and credit agencies. . . .

Europe Must Be Rebuilt by Credit

"The most notable illustration of the emphasis placed upon credit as a remedy for economic and social ills is seen in the discussion of European affairs. We are told that Europe cannot pull herself out of the chasm in which she is plunged without capital resources advanced from without. Europe must be rebuilt by credit. Self-help is not sufficient. We are even told by some that the people of the United States should lend to European enterprises in order to maintain their own prosperity. We must loan to Europe in order that Europe may have the wherewithal to buy from us. If loans will increase production, there is sound business sense in this proposal. . . . Europe, to say nothing of South America, is being scoured by emissaries of American investment bankers to bring back opportunities for credit offerings, which are scattered far and wide to lenders of our country. Since the war, Americans have loaned to foreign countries, including private business undertakings, as well as governments, approximately ten billion dollars. . . .

"We all probably agree that credit has been a most powerful agency in the development of our economic resources, that it facilitates business, and is a help in time of need."

Safety in Wide Dispersion of Credit

In discussing the stability of the credit structure, Doctor Dewey asserted that the wide dispersion of credit is insurance against heavy losses.

"Credit, as we see it today, would not be created and utilized unless there was mutual trust and confidence. . . . Superficially, it may be thought that the units of business are leaning upon each other for support and that consequently business as a whole is unstable. In normal times, however, this mutual support does not signify instability, but if anything, increased strength. Moreover, mistakes of one are shared by others and, through the delicate mechanism of credit, losses are scattered far and wide. If credit be protected at the fountain head, the mistakes need not be many, and the losses will be comparatively in-

(Concluded on page 1744)

House Committee Votes Down Tax Reduction—Opposes Tariff Revision

WASHINGTON, Dec. 14.—The majority members of the House Committee on Ways and Means did not act upon the recommendation of President Coolidge for tax credits at the short session of Congress because of the impossibility of an agreement upon the plan, Chairman William R. Green of the committee yesterday told members of the National Conference of Business Paper Editors. Instead of adopting this plan, the committee turned to the alternate suggestion of the President that the Treasury surplus be used in retiring the public debt. The committee, however, Mr. Green said, is going to have a corps of experts from the Treasury Department and a drafting force from the capitol whip into legislative form a tax reduction bill so it can be taken up by the committee for consideration in October and be ready for introduction as soon as the next Congress convenes in December, 1927.

A number of editors informed Mr. Green that business interests of the country were disappointed at the action of the committee in voting for no tax legislative program at the present session of Congress. It was frankly urged that the actual surplus that now exists in the Treasury can easily be greatly increased merely by the collection of back taxes the amounts of which already have been agreed upon between the Bureau of Internal Revenue and the affected taxpayers, including business institutions. Mr. Green declared, however, that the majority of the committee, after discussing the question, arrived at the conclusion that no agreement was possible at the present session and that therefore it was decided to vote down any reduction program.

Mr. Green, evidently reflecting the majority opinion of Congress and the administration, said he was opposed to tariff revision at either this or the next session of Congress. He expressed the view that, as in all laws covering so many commodities, there are inequities in the present Fordney-McCumber act. But he also said he did not think a better law would be enacted if the question were reopened and that it would mean needless unsettlement of business while the legislation was under way.

New Seamless Pipe Unit for National Tube Lorain Works

The National Tube Co. has been granted authority and an appropriation of \$5,000,000 by the Steel Corporation for the conversion of No. 3 lapweld mill at Lorain, Ohio, works into a seamless unit to have a range of 5-in. to 10-in. pipe sizes. To provide rounds for this mill, a 2-high reversing, electrically driven bar mill will be installed and to replace obsolete power-generating equipment and assure sufficient power to operate these mills, a 15,000-kw. turbo-generator and three 2000-hp. boilers will be installed. The new seamless unit supplements an existing one making 2-in. to 4-in. pipe, and upon completion the Lorain works will be able to furnish oil country seamless pipe in sizes from 2 in. to 10 in.

American Share in French Farm Machinery Imports

WASHINGTON, Dec. 14.—The United States has maintained its predominance in the developing agricultural implement import trade of France, which was characterized by very strong demand during the first nine months of the current year despite a greatly increased domestic production, according to advices to the Department of Commerce from Assistant Trade Commissioner F. P. Waller at Paris. The greater demand is demonstrated by the fact that French imports of those implements increased to a total of 47,036 metric tons valued at 264,453,000 fr. in the first three-quarters of 1926, as compared with 35,156 tons worth 135,520,000 fr. and 44,324 tons valued at 182,199,000 fr. received during the corresponding periods

of 1925 and 1924 respectively. The position of this country in that developing trade is shown by the fact that French imports of agricultural implements from the United States totaled 24,000 metric tons in the period under survey, as compared with 18,562 tons in the same period of 1925. Canada's share in the trade increased to 14,240 metric tons in the 1926 period from 9273 tons in the nine months of 1925.

Makes Separate Divisions of Its Crane and Hoist Business

The Box Crane & Hoist Corporation, Philadelphia, will separate its crane and hoist business into two divisions, effective Jan. 1. The crane business will be under the sales direction of G. A. Mitchell, secretary and sales manager, and the electric hoist division will be under the supervision of R. H. McGredy, former general sales manager of the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. Direct factory branches will be opened in several industrial centers, the first having been opened Dec. 1 in Chicago at room 1649, Strauss Building, 310 South Michigan Avenue, in charge of R. J. Wadd, former chief engineer of the Shepard Electric Crane & Hoist Co. G. A. Mitchell continues as general manager of sales of both divisions.

Automobile Companies Bring High Rate of Building to Flint

The value of products manufactured in Flint, Mich., in 1926 is put at \$423,562,920, and compares with \$24,118,000 in 1909, according to the figures of Harry C. McClure, city engineer, and W. T. Ward, field representative of the United States Treasury, who was assigned to the city in order to study its need for a new post office.

Chief among the building operations now planned or under way is the new gray iron foundry of the Buick Motor Car Co., to cost \$5,000,000. New plants for the Chevrolet Motor Co. at Flint will cost \$500,000, and a new technical school planned for that city by the General Motors Corporation will call for \$400,000. The Fisher Body Co. plans additions to its plants which will cost nearly \$100,000, and a number of small projects under consideration bring the cost of prospective building up to \$13,000,000. The Flint Malleable Iron Co. has a plant under construction on the south side of the city.

Canada to Consider Duties on Coke

WASHINGTON, Dec. 14.—An application for the imposition of duties on coke for metallurgical, foundry and domestic uses and on anthracite screenings for steam purposes and for abolition of the drawback now granted on coal imported by operators of by-product coke ovens will be discussed at a public sitting of the Canadian Tariff Advisory Board on Jan. 18, according to a report received by the Department of Commerce from Assistant Trade Commissioner O. B. North, Ottawa. Under the present Canadian tariff coke and anthracite coal screenings are free of duty and a drawback of 99 per cent of the duty is granted on bituminous coal imported by operators of by-product coke ovens. Hearings for an increase in the duty on bituminous coal will be held later. On Jan. 19 and 20, hearings will be held on several applications for increases in duties, including those on tin in blocks, pigs, or bars.

The business of the Coates Clipper Co., 237 Chandler Street, Worcester, Mass., has been taken over by a new Massachusetts corporation to be known as the Coates Clipper & Mfg. Co., which has a capital stock consisting of 900 no par value common shares. The incorporators are Albert W. Darling, president; E. Howard Reed, treasurer, and M. Clifton Nelson, clerk. Mr. Darling will be the general manager. The company will continue the manufacture of flexible shafting and hand and power clippers.

NEW CARNEGIE SAFETY TROPHY

Bronze and Silver Design Now on Display at Steel Plants to Be the 1927 Award

The Safety Trophy of the Carnegie Steel Co., which is to be put into competition in its eleven plants during 1927, has been completed and is being displayed at the various plants.

This is the sixth year that safety has been on a competitive basis in the Carnegie plants. The five trophies for the preceding years were of bronze and were designed on an allegorical basis, carrying through the five years the story of safety in continuity.

The trophy of 1927, however, is of a more materialistic nature. It is of bronze and silver, 42 in. high. It was designed and produced by one of the foremost silversmiths of the country. The composition might well be termed "The Story of Steel." The huge silver globe representing the world, richly etched and portraying the various modes of transportation of steel and its component parts from continent to continent, rests upon the outstretched wings of a bronze eagle. Surmounting the globe, Mercury or Hermes, guardian of commerce, bears in one hand the caduceus, and with the other holds aloft a silver wreath bearing the word "Safety." The eagle supporting the globe rests on a square bronze base which bears four chased silver panels, upon which are etched views of the steel mills. Flanking the pedestal are two bronze figures of steelmen employed in the Carnegie mills, realistic types, who have had a service of over 35 years without a lost-time accident.

This trophy is held from month to month by the

plant which makes greatest percentage of reduction in lost-time accidents from its preceding five years' record for the month, and at the end of the year, that plant which makes the greatest percentage of reduction for the entire year from its record for the preceding five years receives the trophy permanently.

*Eleven Plants
Will Compete
in 1927 for
This Trophy*



COAL MINING DISCUSSED

American Mining Congress Has Four-Day Session in Washington

WASHINGTON, Dec. 13.—With the adoption of approximately a score of resolutions looking to the betterment of the mining industry the American Mining Congress brought its annual conference to an end here last Friday, after being in session four days. Among other expressions in the resolutions were those opposing Government regulation or control of the coal or other industries and a proposal of the Bureau of Internal Revenue to set up standard depreciation rates for the mining industry, and a request for reduction of the corporation tax by 1 per cent, together with repeal of the stamp tax on corporations.

Numerous addresses were made by Government officials, including Secretary of Commerce Herbert Hoover and Secretary of Labor James J. Davis, as well as several Senators and Nathan B. Williams, Associate Counsel of the National Association of Manufacturers, and leaders in the mining industry.

The following officers were elected: President, Stanley A. Easton, Kellogg, Idaho; first vice-president, William H. Lindsey, Nashville, Tenn.; second vice-president, Robert E. Tally, Jerome, Ariz.; third vice-president, George B. Harrington, Chicago; secretary, J. F. Callbreath, Washington. Executive Committee: Stanley A. Easton, Kellogg, Idaho; Archibald Douglas, New York; Sidney J. Jennings, Boston. Directors: Hugh Shirkie, Terre Haute, Ind.; Stanley A. Easton, Kellogg, Idaho; J. G. Bradley, Dundon, W. Va.; L. S. Cates, Salt Lake City; Archibald Douglas, New York; J. T. Skelly, Wilmington, Del.

Some of the Faults of Coal Mining

Secretary Davis said the coal mining industry tolerates technical evils which should not exist and cited the fact that mining in this country is three times as dangerous as in foreign countries. He referred to the fact that only 60 per cent of the available supply is now mined. He found fault with the policy of selling

steam coal at cost or below cost of production, and making up profit on domestic or spot coal. To check over-development of mines, he recommended the closing for a time of the less profitable mines and abandonment of disastrous competition on a practical workable method of cooperation. He referred to the fact that in Illinois 84 mines operating full time can produce coal now turned out by 1000 mines working part time.

Another Increase in Steel Corporation's Unfilled Orders

Unfilled orders of the United States Steel Corporation increased in November for the third month in succession. The total unfilled business on Nov. 30 amounted to 3,807,447 tons, an increase of 123,786 tons over the 3,683,661 tons on Oct. 31. The increase in October over September was 90,152 tons and in September over August it was 51,174 tons. A year ago the unfilled business was 4,581,780 tons or 774,333 tons more than at the close of November, this year. The orders on the books at the close of last month were the largest since April when they were 3,867,976 tons. The following table gives the unfilled tonnage as reported by months beginning with January, 1924:

	1926	1925	1924
Jan. 31.....	4,882,739	5,037,323	4,798,429
Feb. 28.....	4,616,822	5,284,771	4,912,901
March 31.....	4,379,935	4,863,564	4,782,807
April 30.....	3,867,976	4,446,568	4,208,447
May 31.....	3,649,250	4,049,800	3,628,089
June 30.....	3,478,642	3,710,458	3,262,505
July 31.....	3,602,522	3,539,467	3,187,072
Aug. 31.....	3,542,335	3,512,803	3,289,577
Sept. 30.....	3,593,509	3,717,297	3,473,780
Oct. 31.....	3,683,661	4,109,183	3,525,270
Nov. 30.....	3,807,447	4,581,780	4,031,969
Dec. 31.....	.....	5,033,364	4,816,676

The high record in unfilled orders was 12,183,093 tons at the close of April, 1917. The lowest was 2,674,757 tons on Dec. 31, 1910.

Totaling 14,728,000 net tons production of bituminous coal during the week ended Dec. 4 reached another high point, according to the Bureau of Mines.

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Labor Cooperation in Production

MATTHEW WOLL, vice-president of the American Federation of Labor, averred in a paper presented at last week's meeting of the American Society of Mechanical Engineers that American trade unions are ready to cooperate with manufacturers toward increasing efficiency of production.

"The average workman," said Mr. Woll, "develops a technical knowledge of his job and thinks of ways his work might be better done, waste eliminated and time and energy saved. Because of his intimate contact with job details and his specialized knowledge he can suggest improvements which are outside the experience of management and so make a specialized contribution. When he has no channels through which to voice his ideas, they are lost to the industry. But if the means can be found to make these ideas available for practical use, a working force of men intent upon increasing efficiency can be developed and a chance for all to find creative expression in their work will be provided."

We are sure that the average workman does not develop any such thing and also that those, the few, that do so have adequate channels not only of expression but also of being heard, and moreover they have channels leading to reward. Such workmen become gang bosses, foremen, superintendents, and even presidents. However, we are not proposing to institute a dispute in respect to this phase of the subject. No matter if Mr. Woll be in error, his idea in the main is so important that if his organization holds it seriously, and can persuade its constituents and their membership to conduct themselves accordingly, the great labor organization would be serving a real economic purpose, and would be really promoting the welfare of labor, which is equivalent to saying of society in general.

There is something humorous in the situation. The more enlightened managements are striving to effect improvements. They maintain organizations to invent them. They struggle against resistance in putting them into effect. They devise premium systems giving to the workmen as much as 50 per cent of the gains. They play fair. They

offer rewards to employees for useful ideas. Yet often, and it would seem for the most part, it is all like bucking against a stone wall.

Consequently management looks to the substitution of machines for men, for with machines it has neither to argue nor educate. But there are many operations for which machines can not be substituted. It may be necessary in order to introduce even simple improvements, in the interest of employer and employee alike, perhaps 50-50, to exercise *force majeure*—i. e., orders to do it or quit. Management will not so venture unless labor be plentiful; when there be more men than jobs. In acting thus management is regretful, perhaps ashamed, that such a course has to be taken. It would infinitely prefer willing assent and intelligent cooperation. It does not even abandon hope. It aids, abets and promotes meetings of foremen and educational classes for foremen with a visualization of their instruction, not in the abstractions of metaphysics but in the principles of the particular art they are practicing, and the wish that such education will spread from the foremen among the whole personnel.

In painting the above picture we are not letting our imagination run wild, or run at all, but are photographing experience, thoughts and psychology from real industrial life. There is no question that enlightened management is obsessed by the desire to improve efficiency and is all the time burning midnight oil to do so, and would be overjoyed to extinguish from business all unenlightened management, which no doubt exists to a certain extent in every industry. Now Mr. Woll tells us that the labor leaders would like to do the same thing. With such a recognition of community of interest, of purpose, and everything else, and the proved willingness of management to play fair in division of the profits of the enterprise, it ought to be possible for the two parties to get together.

It will be worth while to have from Mr. Woll some specifications rather than generalities. Will the labor leaders encourage the brick mason to increase his hourly laying of brick? Will the plumber be penalized for forgetting to fetch his tools? Will the garage machinist be discouraged from charging for his mistakes? Will the super-

fluorous bituminous coal miners be advised to switch to other employment and be aided in doing so? Will factory workers be inspired to obey their foremen? Will labor-saving studies become a subject of like rather than dislike? We fear that organized labor will do none of these things until economic pressure compels it.

Indeed, we are at a loss to know just what Mr. Woll means except as to his praiseworthy generalization. Is it possible to cite any valuable idea from the ranks that has ever been lost? What channel for the expression of such ideas can there be that does not already exist? Is not management begging for ideas, praying for them, and offering prizes for them? The reward for ideas may even be as great as that which has accrued to Henry Ford.

New Interest in Chromium

FURTHER laurels for chromium are promised by recent developments. In the last two or three years its use in plating has received much attention. The author of an article on other pages states that chromium electroplating supplies the "sensation" in the field of protective coatings, "in which there have been but few other radical changes in the last decade." The ability to supply a coating that is at the same time bright, non-corrosive and very hard is definitely claimed for chromium, though it has not the flexibility of application that belongs to nickel and some other metals. One of its important uses is on steel surfaces exposed to wear, which now require special hardening processes. Experiments on steel gages have given results so interesting as to warrant continued investigation.

This new development further establishes the place of chromium as a key metal in the alloy field. It is essential in stainless and high-temperature resisting alloys, as well as in many quality alloy steels. No standard high-speed steels are made without it. It made possible permanent magnets when tungsten was scarce in the war days and in such steels is still used quite extensively. In its rôle as a protective coating it promises much.

The Latest British Mission

WORKING more deliberately and with less public attention than the London *Daily Mail* delegation of British trade unionists who visited this country last March, the British Government mission whose members sailed from New York last week presumably made the deeper study of industrial conditions in the United States. Sir William McKenzie, the chairman, and his associates, with their credentials from Premier Baldwin, naturally had access to Washington and other sources of information that were not available to their predecessors. Unlike the *Daily Mail* delegation, the one that has just returned home was of mixed composition, having, in its membership of eight, Government officials, labor union officers and employers. By dividing, the investigators have been able to cover a great deal of ground, one delegation going to the Pacific Coast, and another to Canada. All im-

portant industrial centers in this country were visited.

What all of the visitors sought light upon, in their contacts with American leaders of industry, leaders of labor, economists and Government representatives, the causes underlying what they considered to be steady prosperity in the United States. While they did a great deal of inquiring in the more than ten weeks of their stay, they were chary of opinion respecting American conditions. At the same time they showed full appreciation of facts laid before them which gave a measure of the greater productivity of workers in this country, in view of the absence of social divisions and trade union restrictions which are so marked in Great Britain.

Due to its representative character and its official credentials, the findings of the commission will be given more weight in both countries than has attached to any British review of American industrial conditions since the appearance of a British engineer's anonymous book on "American Competition" more than thirty years ago.

Coal Output Not So Excessive

A COMPARISON of coal production, the importance of which cannot be denied, indicates that much of the recent talk about its having been excessive is premature. The pace attained is very high, but the cumulative production has not got really out of line thus far.

The Bureau of Mines report issued this week shows, for the week ended Dec. 4, a new high record in bituminous coal production, with 14,728,000 net tons in the week, or 2,455,000 tons daily average for the six working days; and these figures are apt to stimulate comment that recent production has been getting quite out of bounds. The short-range comparisons certainly point that way, but as will be shown the long-range comparison comes out quite differently.

What has been done lately is indeed remarkable. Previous to October the record in bituminous coal was the 13,344,000 tons produced the week before the great strike late in 1919. To break a record made in such special circumstances was a remarkable performance, but this was done in the week ended Oct. 30. Each week since has brought a large increase, except for two weeks in which working time was impaired by holidays, and the week ended Dec. 4 shows 10 per cent greater production than the week that held the record until a few weeks ago.

The cumulative production, however, makes an altogether different showing, and it is entitled to very serious consideration. In coal it is essential to consider the seasons. A seasonal index that cannot be far out as a guide may be constructed by taking the years since the war that were not exceptional, thus eliminating 1919 and 1922, and taking the average production respectively to July 3 and to Dec. 4, for comparison with what this year has done.

In the five years, 1920, 1921, 1923, 1924 and 1925, production to July 3, 156 workings days,

averaged 243,860,000 tons and to Dec. 4, 286 working days, it averaged 470,834,000 tons.

This year the 156 days showed 271,899,000 tons and the 286 days showed 530,232,000 tons.

The character of this year as a coal consumer, in the regular channels, was indicated by the production during the first half. The seasonal swing, in ordinary requirements, could not be much different from the average in the five years taken as basis. Working the matter out by the rule of three, the five-year relationship applied to the 271,899,000 tons of this year up to July 3 would indicate 525,000,000 tons for the year up to Dec. 4. The production reported is 530,232,000 tons, representing an insignificant excess.

Such a showing would not be expected in view of the heavy production of recent weeks, and thus attention to the longer range comparison is commended. Nothing has accumulated that needs to be compensated. A continuance of the rate attained may be quite impossible, and probably is, but there is time left for the adjustment and there may not be so radical a turn in production as many in the trade have lately been predicting.

Criticism that a very large bulge in production cannot be justified on the ground of exports is well taken. The exports have not been large relative to our production, and could not be, on account of the Atlantic piers constituting a bottle neck. The total bituminous exports in October were 4,188,365 gross tons, or 4,690,969 net tons, this including our regular exports to Canada. The gain over exports in October, 1925, is about 3,300,000 net tons. Thus there is not room for such a decrease in exports as would count for much, relative to our production.

Commerce Commission Overloaded

SO heavy have the burdens of the Interstate Commerce Commission grown to be in recent years that quick action upon vital matters under its jurisdiction is no longer possible. The commission itself is not responsible for this condition. Such a tribunal cannot hurry unduly, if its adjudication is to be intelligent and just. The country has grown amazingly in the years since the commission was established and the causes brought before it have multiplied accordingly. Many of them are of so involved a nature as to demand much time for their consideration. In most instances the commission's decisions are irrevocable. Many who have had to wait through the long intervals between the bringing of cases and their decision point out that economic losses have resulted and injustice has been done. For example, transportation rates which discriminate against industries of one section of the country in favor of those of another have continued far too long, it is contended. Likewise extensions and improvement of railroad systems have been long delayed, with the consequence that development of territories and communities and industries has been held back, and industries which would have supplied equipment and materials have been deprived of a market for their products.

In a sense the situation is analogous to that in which the Federal courts found themselves some years ago. The Supreme Court of the United States

seemed hopelessly behind in its decisions. Its docket was crowded beyond the chance of being cleared unless some radical remedy were found. Congress acted by conferring upon Circuit Courts of Appeals, in nine judicial districts, a large measure of final jurisdiction in Federal actions. Today litigation in Federal courts is proceeding at a normal rate.

A plan along somewhat similar lines is now proposed for the Interstate Commerce Commission. One of its advocates is President Walter M. W. Splawn of the University of Texas, an economist and formerly a member of the Texas Railroad Commission. In the *Railway Age* he advises dividing the country into districts, perhaps six or seven, each comprising a well-defined freight territory. A district would have its own commerce commission of perhaps five members, which would have final jurisdiction over matters entirely of the district. But the right of appeal to the commission at Washington would be preserved to litigants.

President Splawn points out that the business now handled by the commission is so vast that it is quite unusual for even one commissioner to journey to the locality from which a complaint arises, in order to hear testimony. The commission has been compelled to send out attorney-examiners to make records. Illustrating present conditions, Dr. Splawn cites a case with which he is familiar:

"In my own State in July, 1925, an examiner heard the application of certain railroad companies to build lines or extensions in the South Plains of Texas. Already a year and a half has passed and no decision has been rendered. More than enough time has elapsed for any one of the companies to have carried forward its plans to completion. Capital has stood ready for investment. People are clamoring for the railroad facilities, and yet no company has been able to secure a certificate under which it may proceed with construction. All this delay is not due to the fault of the commission, but to our overburdening it and not taking the pains to set up regulatory machinery adequate to the needs of the country."

Trend in Steel Output

REPORTS during November fully apprised the trade of the decline in steel production then in progress, and the ingot statement showing 3,722,119 tons produced, or 9 per cent less than the 4,092,548 tons reported for October, carried no element of surprise.

There is, however, occasion for quantitative study of the returns, because there has come up the question whether the decline in steel production at this time may be ascribed wholly to what are called seasonal conditions or contains some other element, perhaps of more permanent character.

We have no generally accepted measure as to what is "seasonal" in actual production. There are well recognized seasonal influences, but they work out in various ways according to other circumstances. In the old days it was not easy, in some cases, to relate the big buying movements to seasons of the year, and even if they were so related, the production fell differently.

In these recent years production has been de-

veloping a more seasonal character, and there is material for study. One good way to consider the November tonnage just reported is to note what November has shown in each year lately. The following table shows the percentage deviation in the daily rate of ingot production in November, from the average daily rate of the year:

1918	+ 2	1923	- 14
1919	- 17	1924	+ 6
1920	- 8	1925	+ 10
1921	+ 18	1926	- 5
1922	+ 18		

The computation for this year is made by assuming a 75 per cent producing rate for December, against the 80 per cent rate just shown for November. This would make the year's total slightly over 47,000,000 tons, or approximately 7 per cent gain over last year's.

In the past eight years, as seen by the table, November ran above the year's average five times and below it three times. In the cases of November running light, in 1919 the steel industry was barely recovering from the strike, in 1920 there was the beginning of a stupendous decrease in production, and in 1923 a rapid fall was in progress, but that was fully counterbalanced very early in the new year.

Thus light November production seems in the main to be due to special rather than strictly seasonal conditions. As to the five years out of eight in which November ran above the year's average, however, two years can be promptly counted out, 1918, when November brought the end of the war, and 1921, for then even the November production was almost insignificant. Then there was 1922, when production had been restricted in the summer by the coal strike. This leaves only two years, 1924

and 1925, to be considered more or less normal; yet the net conclusion must be that last month's production was hardly up to what should be considered normal on the basis of information thus far available.

DESPITE the fact that the steel ingot production for 1926 will well exceed all records, an inspection of the statistics of the American Iron and Steel Institute for the first eleven months shows a distinct falling off in the production of electric and crucible steel. To Dec. 1 there was a total of 134,000 tons of steel, outside of open-hearth and Bessemer, as compared with 152,200 tons for the same eleven months last year—a decrease of 18,200 tons, or nearly 12 per cent. Yet the total steel output this year will probably show an increase over 1925 of about 7 per cent. In the previous four years there had been a uniform increase in the output of "all other" steel, largely electric; but the indications point to a shrinkage this year in the operating rate of electric furnaces. This is a surprise, the general impression being that the upward trend in electric steel had continued.

POSTAL rates should be reduced, and thereby the Post Office Department could benefit by the American business practice of realizing low costs on large volume. The advance from 1 to 2 cents on post cards apparently has driven 80 per cent of this business out of existence. Considerable second class matter has been diverted to baggage, bus and freight transportation lines. Third class mail shows a 20 per cent loss in the face of marked industrial activity. The tariff seems to be more than the traffic will bear.

REINFORCING STEEL

Awards Decline to Less Than 1800 Tons—New Projects Also at Low Rate

Awards of concrete reinforcing bars, as reported to THE IRON AGE during the last week, totaled less than 1800 tons, a sharp decline from the comparatively low rate of the last few weeks. New business up for bids will require about 2100 tons. Awards follow:

- NEW ROCHELLE, N. Y., 100 tons, Neptune Storage Warehouse, to Truscon Steel Co.
- NEW YORK, 100 tons, reconstruction work, high bridge over Harlem River, to Kalman Steel Co.
- MINEOLA, N. Y., 100 tons, public school, to Joseph T. Ryerson & Son, Inc.
- NEWARK, N. J., 1020 tons, Lincoln Highway Viaduct, 680 tons, to Igoe Brothers and 340 tons to Joseph T. Ryerson & Son, Inc.
- PERTH AMBOY, N. J., 100 tons, bridge, Central Railroad of New Jersey, to Concrete Steel Co.
- DETROIT, 220 tons, Cleveland School, to Concrete Engineering Co.
- CHICAGO, 100 tons of rail steel, Roscoe Apartments, to Olney J. Dean & Co.
- CHICAGO, 330 tons of billet and rail steel bars, apartment building at Pratt Boulevard and Lakewood Avenue, to Barton System of Reinforcing.
- CHICAGO, 120 tons, apartment building on Lakewood Avenue, to American System of Reinforcing.
- CHICAGO, 200 tons, State Bank of Chicago, to Concrete Steel Co.
- CHICAGO, 100 tons, Belmont School, to Concrete Engineering Co.
- CHICAGO, 100 tons, building for Ring Lodge, Independent Order of Svobliod, to Concrete Steel Co.

CHICAGO, 123 tons, apartment building at 2340 Diversey Parkway, to an unnamed bidder.

VISALIA, CAL., 100 tons, Tulare County Hospital at Visalia, to Kyle & Co., Fresno, Cal.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

- ATLANTIC CITY, N. J., 400 tons, convention hall.
- ASHTABULA, OHIO, 650 tons, bridge, Standish Engineering Co., Chicago, general contractor.
- AURORA, ILL., 100 tons, hotel; Graden & Mayger, architects.
- CHICAGO, 600 tons, Cook County Jail.
- SAN MATEO, CAL., 160 tons, Roman Catholic Monastery; bids being taken.
- KALULUI, T. H., 200 tons, for a wharf; bids in.

Approximately 200 industrial leaders and officials of the War Department attended a meeting of the Business Council of the Department at the Army War College here on Dec. 7, when speakers from the business world praised the efficiency of the planning by the department for procuring supplies. Emphasis was laid on benefits from standardization of products, quantity purchasing, quick payment of bills by the Government and conferences between government officials and business men.

In England nearly 800,000 miners are working, with a probable increase by the end of the year to 900,000, or approximately the full number the industry can absorb for some time, according to a cable to the Department of Commerce from Commercial Attaché W. L. Cooper, at London.

Iron and Steel Markets

Railroad Inquiry the Chief Factor

Largest Week in Structural Awards Since Late April—Quietness
in Bars—Continued Weakness in Sheets—Little
Change in Mill Schedules

ON the whole, steel works operations are little changed. Apart from railroad buying new business still lags, but orders and specifications are slightly better with most of the steel companies than at the opening of December. If, as is to be expected, output falls off further in the holidays, there will be compensation in an increased rate early in the New Year.

With some uncertainty as to the winter scale of consumption of bars, shapes and plates in the metal-working industries, railroad demand is still promising. Chicago district mills estimate that 210,000 tons of car steel is now on inquiry from car works and railroads, and expect to quote on 150,000 tons additional in the near future.

Roughly 2200 cars were ordered by the railroads in the past week, including 2000 for the Norfolk & Western. Track requirements are still on a large scale, the B. & O. being the latest system to add materially to its inquiries. Three railroads have closed at Chicago for 25,000 tons of track supplies.

Some automobile companies are feeling the market on sheets for January shipment and have sent in specifications for alloy steel bars. Other builders have suspended shipments because their plants will be shut down shortly for inventories. Definite indications as to January schedules are lacking.

The sheet market in the Central West shows little improvement, either from the standpoint of price or volume. Some mills continue to make concessions to get early shipment orders. While the common range on No. 24 black sheets is 2.90c. to 3c., Pittsburgh, 2.85c. has been done. In blue annealed, sales have been made as low as 2.25c., Valley mill.

Rail mill operations are expanding as the time approaches when shipments can begin against 1927 orders. Chicago district mills are running at close to 75 per cent.

Chicago, Pittsburgh, Youngstown and Cleveland report light buying of steel bars, which lead all rolled products in annual output. Buyers apparently are supplied for some weeks ahead, and in many cases are now receiving 1.90c. bars, as against 2c. asked for first quarter.

In some districts competition for plate business is keener. Some buyers in the Southwest, by making good use of the fabrication-in-transit privilege, have been able to improve on Chicago

base quotations. Eastern plate mills are barely maintaining a 50 per cent operation.

Bookings of fabricated structural steel, at more than 63,500 tons, were the largest reported for a week since late in April. Included was 11,500 tons for subway work in New York, 9400 tons for the Chesapeake-Hocking Valley connecting line in Ohio, 6000 tons each for a hotel in New York and an office building in Providence, and 5000 tons for a Mississippi River bridge at Cape Girardeau.

Predictions of a new record in tin plate output this year are confirmed by the fact that the American Sheet & Tin Plate Co. shipments to Nov. 30 equaled those of the entire year 1925. In the first two weeks of this month the company did remarkably well, having all its 256 mills in operation.

Competition from other districts, particularly New York State, has caused a decline of 50c. a ton in foundry pig iron in eastern Pennsylvania, sales having been made at \$22 at furnace. Foreign pig iron is less of a factor in Eastern seaboard markets than at any time this year.

The Standard Sanitary Mfg. Co.'s inquiries for 12,000 tons of pig iron, which may be increased to 20,000 tons, are expected to develop the basis on which contract business can be done in Central territory, after the period of uncertainty which has resulted from the unusual situation in coal and coke.

It now appears that considerable blast furnace coke was sold for the first quarter at \$3.60 to \$3.75 plus extra cost of the miners' union wage scale, should it continue. While it was expected that a number of operators in Connellsville and other districts would reduce wages this week, no such action has been taken and is not likely to be, for this month at least.

France and Belgium divide 1300 tons of cast iron pipe for Los Angeles. The year's imports from Europe have been greater than those of 1925, amounting to 62,000 tons up to Oct. 31.

Lowering of foundry iron in eastern Pennsylvania reduced THE IRON AGE pig iron composite price to \$19.96, from \$20.04 last week and a recent high of \$20.21 on Nov. 9. One year ago it was \$21.79.

For the tenth week THE IRON AGE composite price of finished steel stands at 2.453c. per lb., the same as one year ago. This is the highest level recorded in more than 18 months; the lowest was only 2 1/3 per cent below the current figure, showing a very narrow range of movement.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At Date, One Week, One Month, and One Year Previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 14, 1926	Dec. 7, 1926	Nov. 16, 1926	Dec. 15, 1925
No. 2, fdy., Philadelphia...	\$22.76	\$23.26	\$23.26	\$23.76
No. 2, Valley furnace....	19.00	19.00	19.00	20.50
No. 2, Southern, Cin'tl....	23.69	23.69	23.69	25.69
No. 2, Birmingham.....	20.00	20.00	20.00	22.00
No. 2 foundry, Chicago*	21.00	21.00	21.00	23.00
Basic, del'd eastern Pa....	22.00	22.00	23.00	23.00
Basic, Valley furnace....	18.50	18.50	18.50	20.00
Valley Bessemer, del'd P'gh	21.76	21.76	21.76	22.76
Malleable, Chicago*	21.00	21.00	21.00	23.00
Malleable, Valley	19.00	19.00	19.00	20.50
Gray forge, Pittsburgh....	20.26	20.26	20.26	21.76
L. S. charcoal, Chicago...	27.04	27.04	27.04	29.04
Ferromanganese, furnace..	100.00	100.00	100.00	115.00

Rails, Billets, etc., Per Gross Ton:

	Dec. 14, 1926	Dec. 7, 1926	Nov. 16, 1926	Dec. 15, 1925
O.-h. rails, heavy, at mill.	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.96
Bess. billets, Pittsburgh...	35.00	35.00	35.00	35.00
O.-h. billets, Pittsburgh...	35.00	35.00	35.00	35.00
O.-h. sheet bars, P'gh.....	36.00	36.00	36.00	36.00
Forging billets, P'gh.....	40.00	40.00	40.00	40.00
O.-h. billets, Phila.....	40.30	40.30	40.30	40.30
Wire rods, Pittsburgh....	45.00	45.00	45.00	45.00
Skelp, grvd. steel, P'gh, lb.	1.90	1.90	1.90	1.90

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.22	2.22	2.22	2.22
Iron bars, Chicago.....	2.00	2.00	2.00	2.00
Steel bars, Pittsburgh...	2.00	2.00	2.00	2.00
Steel bars, Chicago.....	2.10	2.10	2.10	2.10
Steel bars, New York.....	2.34	2.34	2.34	2.34
Tank plates, Pittsburgh...	1.90	1.90	1.90	1.90
Tank plates, Chicago.....	2.10	2.10	2.10	2.10
Tank plates, New York...	2.24	2.24	2.24	2.04
Beams, Pittsburgh	2.00	2.00	2.00	1.90
Beams, Chicago	2.10	2.10	2.10	2.10
Beams, New York.....	2.34	2.34	2.34	2.24
Steel hoops, Pittsburgh...	2.50	2.50	2.50	2.50

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire,	Dec. 14, 1926	Dec. 7, 1926	Nov. 16, 1926	Dec. 15, 1925
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	3.00	3.00	3.00	3.20
Sheets, black, No. 24, Chi-				
cago dist. mill.....	3.20	3.20	3.20	3.30
Sheets, galv., No. 24, P'gh	3.85	3.85	3.85	4.15
Sheets, galv., No. 24, Chi-				
cago dist. mill.....	4.05	4.05	4.05	4.25
Sheets, blue, 9 & 10, P'gh	2.30	2.30	2.30	2.50
Sheets, blue, 9 & 10, Chi-				
cago dist. mill.....	2.50	2.50	2.50	2.60
Wire nails, Pittsburgh....	2.65	2.65	2.65	2.65
Wire nails, Chicago dist.				
mill	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh....	2.50	2.50	2.50	2.50
Plain wire, Chicago dist.				
mill	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh...	3.35	3.35	3.35	3.35
Barbed wire, galv., Chi-				
cago dist. mill.....	3.40	3.40	3.40	3.40
Tin plate, 100 lb. box, P'gh	\$5.50	\$5.50	\$5.50	\$5.50

Old Material, Per Gross Ton:

	Dec. 14, 1926	Dec. 7, 1926	Nov. 16, 1926	Dec. 15, 1925
Carwheels, Chicago	\$14.50	\$14.50	\$14.50	\$18.50
Carwheels, Philadelphia...	16.50	16.50	16.50	18.50
Heavy melting steel, P'gh	17.00	17.00	17.00	19.00
Heavy melting steel, Phila.	15.50	15.50	15.50	17.50
Heavy melting steel, Ch'go	13.00	13.00	13.00	15.50
No. 1 cast, Pittsburgh....	16.00	16.00	16.00	18.00
No. 1 cast, Philadelphia...	17.00	17.00	17.00	18.00
No. 1 cast, Ch'go (net ton)	16.00	16.00	16.00	17.00
No. 1 RR. wrot., Phila....	17.00	17.00	17.00	18.50
No. 1 RR. wrot., Ch'go (net)	12.00	12.00	12.50	13.75

Coke, Connellsville, Per Net Ton at Oven:

	Dec. 14, 1926	Dec. 7, 1926	Nov. 16, 1926	Dec. 15, 1925
Furnace coke, prompt....	\$3.50	\$3.50	\$4.25	\$3.75
Foundry coke, prompt....	4.50	4.50	5.50	5.00

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.75	13.75	14.00	14.25
Electrolytic copper, refinery	13.37 1/2	13.37 1/2	13.62 1/2	13.75
Zinc, St. Louis.....	7.05	7.00	7.25	8.55
Zinc, New York.....	7.40	7.35	7.60	8.90
Lead, St. Louis.....	7.70	7.65	7.80	9.00
Lead, New York.....	7.90	7.90	8.00	9.25
Tin (Straits), New York...	68.62 1/2	69.50	71.00	61.37 1/2
Antimony (Asiatic), N. Y.	13.00	13.75	13.25	22.00

Pittsburgh

Non-Union Miners' Wages Are Not Reduced—Steel Business Shows No Further Recession

PITTSBURGH, Dec. 14.—The steel business is still rather slow, but the total of orders and specifications, if anything, is a little larger than it was recently, and the fact that there has been no further decrease in plant operations suggests that an ingot production rate of between 65 and 70 per cent of capacity approximately balances the present rate of demand.

Slightly heavier releases of suspended shipments of steel by the automotive industry are noted, and manufacturers are also encouraged by the positive signs of revived interest on the part of railroads and by some fairly large contracts, accompanied by January shipping instructions, for plain wire and mixed carloads of wire products. Rail mill operations are expanding as the time approaches when shipments can begin against 1927 orders, and makers of track accessories have lately had considerable accessions to order books. Oil storage tanks are being placed in fair number, and to a small extent at least this business is making up some of the loss of pipe demand from the oil industry.

Pipe business generally is quieter than it has been, and the sheet market does not show much life outside of automobile body sheets, in which releases against suspended shipments are being supplemented by a few new orders. Tin plate business is still good, although a 100 per cent operation by the leading producer over

a period of 11 days is hardly typical of this branch of the industry, as the independent makers are not provided with order books that make possible much anticipation of shipments. This year will see another high record mark in tin plate production and probably in shipments, although some of the independent companies have produced more tin plate than they have shipped this year.

Although merchant pig iron producers have abandoned the extreme prices they thought themselves entitled to following the Nov. 1 advance in coal mine and coke oven wages and the consequent increase in the price of contract coke, developments of the week have been favorable to a firmer stand on pig iron. There were expectations that in the Connellsville and other non-union mining districts notices would be posted reducing wages to the November, 1919, scale, effective Dec. 16, but no such action has been taken and there is some doubt that the reduction will be made on the next pay period, which begins Jan. 1. A number of coal producers have contracts that carry high enough prices to permit the payment of the higher scale over the turn of the year. Another condition is that trouble is feared with the termination of the Jacksonville wage scale on April 1 and there is some disinclination to invite it prior to that date.

Coal is selling so low that the operation of economic law will force many mines either to suspend operations or to cut wages. Pig iron producers, however, point out that the present cost of furnace coke is actual and contracts that have been made for first quarter tonnages carry prices as high as they are now paying with the wage clause operative. Little has been said about first

quarter furnace coke contracts, but it develops that considerable business for that period was quietly done at \$3.60 to \$3.75, to which is to be added the extra cost of the high wage scale in the event it is maintained. The base price remains if the wages are reduced, and pig iron should bring present prices for first quarter, producers assert, if they are to have a profit.

Pig Iron.—There is at least some improvement in inquiry, if not in actual business. The Standard Sanitary Mfg. Co. has entered the market for first quarter iron, and while the inquiry calls for only 6000 tons for its Pittsburgh district plants and a like amount for its Louisville, Ky., works, it is generally expected that the company's purchases will be at least 20,000 tons. This business should clearly define the market on large tonnages of foundry iron, which lately has been in doubt because of the paucity of demand. It is significant that coincident with this inquiry there was general abandonment of the quotation of \$20, Valley furnace, which a number of makers had been naming but which found a basis only in small-lot sales. A Pittsburgh district steel maker is in the market for 2000 tons of Bessemer iron but seems unwilling to pay the commonly quoted price of \$20, Valley furnace. The market is untested on basic iron. As it now lines up, the market is squarely quotable, without range, at the prices that these reports for the past six weeks have shown to be the prevailing levels. Reports about pig iron stocks on furnace yards suggest a heavy stock of foundry iron but rather moderate piles of the steel-making grades. Potential merchant production is still diminishing. The furnace of the Kittanning Iron & Steel Mfg. Co., Kittanning, Pa., has been sold for scrap, and the report is current that this soon will be the case with the Fannie furnace, Hanna Furnace Co., West Middlesex, Pa., and the old McKeefery Iron Co. furnace at Leetonia, Ohio, recently sold at auction and bid in by the bondholders.

We quote Valley furnace, the freight for delivery to the Cleveland or Pittsburgh district being \$1.76 per gross ton:

Basic	\$18.50
Bessemer	20.00
Gray forge	18.50
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.00
Low phosphorus, copper free	28.00

Ferroalloys.—The New Jersey Zinc Co. has opened its books on spiegeleisen for the first half of 1927, naming the same prices as have ruled during most of this year, or \$30 to \$31, furnace, for large tonnages of 19 to 21 per cent material. For single carloads this grade is held at \$35, furnace, for shipment next month and at \$37 for prompt delivery. Consumers of ferromanganese in this district are rather slow to sign contracts covering their requirements for the first half of next year. Domestic producers will deliver in the first quarter of 1927 tonnages not taken out on 1926 contracts, which generally carried a price of \$88, Atlantic seaboard. This gives several large buyers sufficient coverage to allow them to stay out of the market. Users of 50 per cent ferrosilicon have not been in any

haste to sign 1927 contracts. Prices are given on page 1721.

Steel and Iron Bars.—Some quickening of demand is noted from makers of cold-finished steel bars in response to large releases against suspended tonnages by the automobile parts makers, but generally the demand for steel bars leaves much to be desired, and makers find it necessary to canvass earnestly to get enough specifications to maintain mill schedules well below the recent rate. On new business, the mills are still holding firmly to 2c., base Pittsburgh, and are naming that price on first quarter tonnages, but actual business both in prompt and deferred shipment tonnages is light. Iron bars are lower, with refined iron grade quoted in carloads at 2.90c., base Pittsburgh, and larger lots subject to negotiation.

Semi-Finished Steel.—Business is slow in all forms of semi-finished steel. Non-integrated manufacturers are not operating heavily enough to need much steel at present, and the outlook for the first quarter of the new year is not clearly enough defined to permit them to make intelligent estimates of their requirements for that period. The operation of all sheet mills is not more than 70 per cent, and the mills rolling purchased steel do not seem to be doing that well, while strip mill operations are not more than 50 per cent of capacity. The latter constitute the principal outlet for commercial billets and slabs. Prices are unchanged, but nominal, since a real test of them is not possible with the demand so limited as it is. Open-market activity in wire rods and pipe skelp is also light. Prices are given on page 1721.

Structural Steel.—There is a fairly large amount of structural steel in sight in projected additions to steel plants in the coming year, but this district does not offer much early 1927 business in construction of other kinds. Local shops are running low on orders and have not had much success in securing business outside of the Pittsburgh area on account of keen price competition. Orders for plain material are not equaling shipments against old contracts, but the need for business is not so acute that Pittsburgh mills are willing to go under 2c., base Pittsburgh, on the general run of tonnages.

Plates.—The outlook for plate business has been measurably improved by inquiries for railroad cars that recently have come on the market, while actual business has been helped by some good orders for oil storage tanks recently placed with Youngstown district fabricators. A total of thirteen 80,000-bbl. tanks, requiring 3250 tons of plates, recently was placed by Southwestern oil companies. The market is easily described as firm at 1.90c., base Pittsburgh, on plates, for while total plate-making capacity is large in comparison with demand, capacity that can be operated profitably at present prices is not materially in excess of present demands.

Wire Products.—The market is still quiet. There is no tendency on the part of distributors to add to their stocks, and purchases, based strictly on actual requirements, reflect the paucity of business common to

THE IRON AGE Composite Prices

Finished Steel Dec. 14, 1926, 2.453c. Per Lb.

One week ago	2.453c.
One month ago	2.453c.
One year ago	2.453c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 87 per cent of the United States output of finished steel.

	High		Low	
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15;	2.460c.,	Oct. 14
1923	2.824c.,	April 24;	2.446c.,	Jan. 2

Pig Iron Dec. 14, 1926, \$19.96 Per Gross Ton

One week ago	\$20.04
One month ago	20.13
One year ago	21.79
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1926	\$21.54,	Jan. 5;	\$19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7
1924	22.88,	Feb. 26;	19.21,	Nov. 3
1923	30.86,	March 20;	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
F.o.b. Pittsburgh mills.....	2.00c. to 2.10c.
F.o.b. Chicago.....	2.10c.
Del'd Philadelphia.....	2.32c.
Del'd New York.....	2.34c.
Del'd Cleveland.....	2.19c.
F.o.b. Cleveland, sizes up to 1-in. rounds.....	2.00c.
F.o.b. Birmingham.....	2.15c. to 2.25c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills.....	2.00c. to 2.10c.
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Rail Steel

F.o.b. mill.....	1.80c. to 1.90c.
F.o.b. Chicago.....	1.90c. to 2.00c.

Iron

Common iron, f.o.b. Chicago.....	2.00c.
Refined iron, f.o.b. P'gh mills.....	2.90c. to 3.00c.
Common iron, del'd Philadelphia.....	2.22c.
Common iron, del'd New York.....	2.24c.

Tank Plates

Base Per Lb.

F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.10c.
F.o.b. Birmingham.....	2.00c. to 2.15c.
Del'd Cleveland.....	2.09c.
Del'd Philadelphia.....	2.22c.
Del'd New York.....	2.24c.
C.i.f. Pacific ports.....	2.30c.

Structural Shapes

Base Per Lb.

F.o.b. Pittsburgh mill.....	2.00c. to 2.10c.
F.o.b. Chicago.....	2.10c.
F.o.b. Birmingham.....	2.15c. to 2.25c.
Del'd Cleveland.....	2.19c.
Del'd Philadelphia.....	2.22c. to 2.32c.
Del'd New York.....	2.24c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

Base Per Lb.

All gages, narrower than 6 in., P'gh.....	2.50c.
All gages, 6 in. and wider, P'gh.....	2.30c.
All gages, narrower than 6 in., Chicago.....	2.50c. to 2.60c.
All gages, 6 in. and wider, Chicago.....	2.50c.

Cold-Finished Steel

Base Per Lb.

Bars, f.o.b. Pittsburgh mills.....	2.30c. to 2.40c.
Bars, f.o.b. Chicago.....	2.40c.
Bars, Cleveland.....	2.45c.
Shafting, ground, f.o.b. mill.....	2.55c. to 3.00c.
Strips, f.o.b. Pittsburgh mills.....	3.00c. to 3.40c.
Strips, f.o.b. Cleveland mills.....	3.00c. to 3.40c.
Strips, delivered Chicago.....	3.30c. to 3.70c.
Strips, f.o.b. Worcester mills.....	3.75c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

Base Per Keg

Wire nails.....	\$2.65
Galv'd nails, 1-in. and longer.....	4.65
Galv'd nails, shorter than 1-in.....	4.90
Galvanized staples.....	3.35
Polished staples.....	3.10
Cement coated nails.....	2.65

Base Per 100 Lb.

Bright plain wire, No. 9 gage.....	\$2.50
Annealed fence wire.....	2.65
Spring wire.....	3.60
Galv'd wire, No. 9.....	3.10
Barbed wire, galv'd.....	3.35
Barbed wire, painted.....	3.10

Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh.....	\$65.00
F.o.b. Cleveland.....	65.00
F.o.b. Anderson, Ind.....	66.00
F.o.b. Chicago district mills.....	67.00
F.o.b. Duluth.....	68.00
F.o.b. Birmingham.....	68.00

Sheets

Blue Annealed

Base Per Lb.

Nos. 9 and 10, f.o.b. Pittsburgh.....	2.30c. to 2.40c.
Nos. 9 and 10, f.o.b. Ch'go dist. mill.....	2.50c.
Nos. 9 and 10, del'd Philadelphia.....	2.62c. to 2.72c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.60c. to 2.70c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.90c. to 3.10c.
No. 24, f.o.b. Ch'go dist. mill.....	3.20c.
No. 24, del'd Philadelphia.....	3.22c. to 3.32c.
No. 24, f.o.b. Birmingham.....	3.30c. to 3.40c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade.....	4.25c.
No. 24, f.o.b. Pittsburgh, B grade.....	4.10c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.85c. to 3.95c.
No. 24, f.o.b. Chicago dist. mill.....	4.05c.
No. 24, del'd Philadelphia.....	4.17c. to 4.32c.
No. 24, f.o.b. Birmingham.....	4.20c. to 4.30c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.15c. to 3.25c.
No. 28, f.o.b. Chicago dist. mill.....	3.25c. to 3.35c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.25c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	4.30c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.50
Standard cokes, f.o.b. Gary and Elwood, Ind.....	5.60

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating, 100 lb. base.....	\$11.40
8-lb. coating I.C. 11.70	30-lb. coating I.C. 19.45
15-lb. coating I.C. 14.55	40-lb. coating I.C. 21.65

Alloy Steel Bars

(F.o.b. Pittsburgh or Chicago)

S. A. E. Series Numbers	Base Per 100 Lb.
2100* (1/2% Nickel, 0.10% to 0.20% Carbon).....	\$3.20 to \$3.25
2300 (3/4% Nickel).....	4.35 to 4.50
2500 (5% Nickel).....	5.50 to 5.65
3100 (Nickel Chromium).....	3.40 to 3.50
3200 (Nickel Chromium).....	5.00 to 5.25
3300 (Nickel Chromium).....	7.00 to 7.25
3400 (Nickel Chromium).....	6.25 to 6.50
5100 (Chromium Steel).....	3.40 to 3.50
5200* (Chromium Steel).....	7.00 to 7.50
6100 (Chrom. Vanadium bars).....	4.30
6100 (Chrom. Vanad. spring steel).....	3.80
9250 (Silicon Manganese spring steel).....	3.20 to 3.25
Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.).....	4.10 to 4.20
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.).....	4.30
Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.).....	4.25 to 4.35
Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.).....	3.40 to 3.50
Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum).....	4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2 1/2-in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specifications, but numbered by manufacturers to conform to S. A. E. system.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	\$36.00 to \$38.00

Track Equipment

(F.o.b. Mill)

Base Per 100 Lb.

Spikes, 3/4 in. and larger.....	\$2.80 to \$3.00
Spikes, 1/2 in. and smaller.....	2.90 to 3.25
Spikes, boat and barge.....	3.25
Track bolts, all sizes.....	3.90 to 4.50
Tie plates, steel.....	2.95
Angle bars.....	2.75

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
1/4.....	45	19 1/2	3/4 to 1.....	22	2
1/2 to 3/4.....	51	25 1/2	1 to 1 1/4.....	28	11
1.....	56	42 1/2	1 1/4 to 1 1/2.....	30	12
1 1/4.....	60	48 1/2			
1 to 3.....	62	50 1/2			

Lap Weld

2.....	55	43 1/2	2.....	23	7
2 1/4 to 6.....	59	47 1/2	2 1/4.....	26	11
7 and 8.....	56	43 1/2	3 to 6.....	28	18
9 and 10.....	54	41 1/2	7 to 12.....	26	11
11 and 12.....	53	40 1/2			

Butt Weld, extra strong, plain ends

1/4.....	41	24 1/2	1/4 to 3/4.....	+19	+54
1/2 to 3/4.....	47	30 1/2	3/4.....	21	7
1.....	53	42 1/2	1 to 1 1/4.....	28	12
1 1/4.....	58	47 1/2	1 to 1 1/2.....	30	14
1 to 1 1/4.....	60	49 1/2			
1 to 3.....	61	50 1/2			

Lap Weld, extra strong, plain ends

2.....	53	42 1/2	2.....	23	9
2 1/4 to 4.....	57	46 1/2	2 1/4 to 4.....	29	15
4 1/2 to 6.....	56	45 1/2	4 1/2 to 6.....	28	14
7 to 8.....	52	39 1/2	7 to 8.....	21	7
9 and 10.....	46	32 1/2	9 to 12.....	16	2
11 and 12.....	44	31 1/2			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel	Charcoal Iron
2 to 2 1/4 in.....	27
2 1/2 to 2 3/4 in.....	37
3 in.....	40
3 1/4 to 3 1/2 in.....	42 1/2
4 to 13 in.....	46
	1 1/4 in..... +18
	1 1/2 to 1 3/4 in..... +8
	2 to 2 1/4 in..... -2
	2 1/2 to 3 in..... -7
	3 1/4 to 4 1/2 in..... -9

Beyond the above discounts, 5 to 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.....	60	3 in.....	45
1 1/4 to 1 1/2 in.....	52	3 1/4 to 3 1/2 in.....	47
1 1/2 in.....	36	4 in.....	60
2 to 2 1/4 in.....	31	4 1/2, 5 and 6 in.....	45
2 1/4 to 2 3/4 in.....	39		

Hot Rolled

2 and 2 1/4 in.....	34	3 1/4 and 3 1/2 in.....	50
2 1/2 and 2 3/4 in.....	42	4 in.....	53
3 in.....	48	4 1/2, 5 and 6 in.....	48

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base.....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 18 ft. and for commercially exact lengths. Warehouse discounts on small lots are less than the above.	

this time of the year. The common expectation is that demand will be larger after the turn of the year. Prices are holding well.

Rails and Track Supplies.—Local manufacturers shared in the recent distribution of track supply orders by the New York Central Lines and expect a part of the Pennsylvania Railroad business, which will be placed soon. Order books are of fairly large proportions, but specifications are not very large just now. The same situation exists in standard-section rails, but production will begin to expand toward the end of the month and shipments will be heavier in January, as the roads get ready for the track-laying season. Light-section rails are slow, but prices are holding. Prices are given on page 1719.

Tubular Goods.—Demand for welded pipe is running down, as it usually does at this time of year, which is the time of light consumption and also the period when jobbers try to avoid large inventories. There is probably a 70 per cent operation of all welded pipe-making capacity, with production somewhat above that rate in lapwelded pipe and below it in butt-welded pipe furnaces. Engagement of lapwelded capacity has been helped by the recent line-pipe orders, and mills located in States where there is no inventory tax on raw and finished materials are building up mill stocks. Boiler tubes are only moderately active. Discounts are given on page 1719.

Sheets.—Automobile body builders are taking out sheets on old orders with a fair degree of freedom, and a little new business in that line is also reported. But in a general way business is quiet, whether viewed from the standpoint of specifications on old orders or of new business. The advanced prices on the common finishes of sheets for fourth quarter, which were reaffirmed for the first quarter of next year, are not holding except in a quotational way. The higher levels never found much basis in sales, and now little trouble is experienced by buyers in getting black sheets at 3c., base Pittsburgh, galvanized at 3.85c., base, and blue annealed at 2.30c., base, either for prompt or future shipment. Mill operations are averaging about 70 per cent of capacity.

Tin Plate.—The American Sheet & Tin Plate Co. probably has made a record in mill operations, as from Dec. 1 to and including Dec. 13, it had all of its 256 mills running. This company in the 11 months ended Nov. 30, shipped as much tin plate as in the entire year, 1925, and with the independent producers making almost as good a showing, it looks as if another new high record would be established this year. Output appears to have exceeded shipments, as some of the independent mills in the past two months have been producing against future orders. Independent mill operations are still reasonably full, but some falling off is likely in the last week of the month, as rolling against January quotas is fairly well completed. Export business is still reported to be fairly good.

Cold-Finished Steel Bars.—Larger makers are making a firm stand at 2.40c., base Pittsburgh, but 2.30c. has not entirely disappeared, as that price has been quoted within the past week by at least three small producers. This is a natural condition seeing that

there is not enough business for the engagement of more than 50 per cent of productive capacity, and this means a strong need for business by some makers. First quarter contracts are reported to be fairly heavy, but there are no specifications against them of consequence as yet.

Hot-Rolled Flats.—New features are absent. Demand is moderate in the extreme, but there is close observance of quotations by producers. This branch of the industry needs an active operation of automobile plants to do well.

Cold-Rolled Strips.—A number of makers are quoting and securing business on the following price schedule: For lots of 1 to 3 tons, 3.40c., base Pittsburgh or Cleveland; lots of more than 3 tons to 10 tons, 3.40c. less 0.10c.; lots of more than 10 tons to 18 tons, 3.40c. less 0.15c.; lots of more than 18 tons to 50 tons, 3.40c. less 0.25c.; lots of more than 50 tons, 3.40c. less 0.40c.—all for one size and temper, with shipment to be made at one time. All makers have not subscribed to this schedule, and there are quotations of 3.25c., base, plus the present quantity extras, which produce a slightly lower average to the buyer than the graduated prices based on quantities. The market is quotable at 3c. to 3.40c., base Pittsburgh or Cleveland, representing a further recession of \$2 a ton from what mills here recently sought. Business still feels the low present and immediately prospective rate of automobile production.

Bolts, Nuts and Rivets.—Demand for bolts and nuts is not so heavy as to give all makers an economical operation, and there are still some cases of producers quoting the carload discount for less-than-carload lots. The rivet market is still unsettled. All of the larger local producers are now quoting large structural and boiler rivets at the same base, having followed the lead of another local maker in waiving the extra on the latter. There is a quotation on large rivets of \$2.60, base, per 100 lb., but the actual market is nearer \$2.40. Prices and discounts are given on page 1721.

Coke and Coal.—No material change is noted in prices, except that slack grade of coal is slightly lower than a week ago. Demand both for coke and coal is very limited, but an expected reduction in wages to become effective Dec. 16, has not materialized, and a lowering of prices that would have resulted has been deferred. There seems to be some fear of cutting wages at this time, because a good many mines are running full at the advanced wage scale and a reduction might make for dissatisfaction and possible labor troubles.

Old Material.—The market exhibits rather good resistance to a slow demand. One mill in the district paid \$17.25 for a moderate-sized tonnage of heavy melting steel, and another, \$17, and those prices constitute the quotational range this week. Offerings of this grade are not any too plentiful, and dealers who recently sold for shipment to one point in the district at \$16.75 are not finding it easy to cover the sale at less. Machine shop turnings are slightly lower, and recent prices cannot be obtained on blast furnace grades.

We quote for delivery to consumers' yards in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Tank plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Black sheets (No. 24 gage), 25 or more bundles	3.95c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.70c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.40c.
Cold-finished shafting and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Rands	3.60c.
Spikes, large	3.30c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Bolts, track	4.90c.
Wire, black soft annealed, base per 100 lb. \$	3.00
Wire, galvanized soft, base per 100 lb.	3.00
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

Per Gross Ton	
Heavy melting steel	\$17.00 to \$17.25
Scrap rails	16.00 to 16.50
No. 1 cast, cupola size	16.00 to 16.50
Compressed sheet steel	15.50 to 16.00
Bundled sheets, sides and ends	14.50 to 15.00
Railroad knuckles and couplers	18.50 to 19.00
Railroad coil and leaf springs	18.50 to 19.00
Low phosphorus blooms and bil-	
let ends	21.00 to 21.50
Low phosphorus mill plates	20.50 to 21.00
Low phosphorus, light grade	17.50 to 18.00
Low phosphorus punchings	18.50 to 19.00
Steel car axles	21.50 to 22.00
Cast iron wheels	16.00 to 16.50
Rolled steel wheels	18.50 to 19.00
Machine shop turnings	11.25 to 11.75
Short shoveling steel turnings	12.50 to 13.00
Sheet bar crops	17.00 to 17.50
Heavy steel axle turnings	15.00 to 15.50
Short mixed borings and turnings	12.00 to 12.50
Heavy breakable cast	15.00 to 15.50
Cast iron borings	12.00 to 12.50
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	17.00 to 17.25
Railroad or automobile malleable	
scrap	17.00 to 17.50

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel F.o.b. Pittsburgh or Youngstown

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and over.....	\$35.00
Rerolling, under 4-in. to and including 1 1/4-in.	36.00
Forging, ordinary	40.00
Forging, guaranteed	45.00

Sheet Bars	
	Per Gross Ton
Open-hearth or Bessemer	\$36.00

Slabs	
	Per Gross Ton
8 in. x 2 in. and larger.....	\$35.00
Smaller than 8 in. x 2 in.	36.00
Skelp	
	Per Lb.
Grooved	1.90c.
Sheared	1.90c.
Universal	1.90c.

Wire Rods	
	Per Gross Ton
*Common soft, base.....	\$45.00
Screw stock	\$5.00 per ton over base
Carbon 0.20% to 0.40%..	2.00 per ton over base
Carbon 0.41% to 0.55%..	5.00 per ton over base
Carbon 0.56% to 0.75%..	7.50 per ton over base
Carbon over 0.75%.....	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is \$46. Cleveland mill base, \$45.

Prices of Raw Materials

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron.....	\$4.55
Old range non-Bessemer, 51.50% iron.....	4.40
Mesabi Bessemer, 51.50% iron.....	4.40
Mesabi non-Bessemer, 51.50% iron.....	4.25
High phosphorus, 51.50% iron.....	4.15
Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria—9.50c. to 10c. Iron ore, Swedish, average 66% iron.....	9.50c.
Manganese ore, washed, 52% manganese, from the Caucasus	40c.
Manganese ore, high grade, nominal, .35c. to 44c. Tungsten ore, high grade, per unit, in 60% concentrates	\$11.75 to \$12.50
Per Ton	
Chrome ore, Indian basic, 48% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard.....	\$22.50
Per Lb.	
Molybdenum ore, 85% concentrates of MoS ₂ delivered	50c. to 55c.

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$3.50 to \$3.75
Foundry, f.o.b. Connellsville prompt	4.50 to 5.50
Foundry, by-product, Ch'go ovens	9.75
Foundry, by-product, New England, del'd	13.50
Foundry, by-product, Newark or Jersey City, delivered.....	10.59 to 11.77
Foundry, Birmingham	5.50 to 6.00
Foundry, by-product, St. Louis or Granite City	10.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.75 to \$2.25
Mine run coking coal, f.o.b. W. Pa. mines	2.00
Mine run gas coal, f.o.b. Pa. mines	2.10 to 2.25
Steam slack, f.o.b. W. Pa. mines..	1.50 to 1.75
Gas slack, f.o.b. W. Pa. mines....	1.75 to 2.00

Ferromanganese	
	Per Gross Ton
Domestic, 80%, furnace or seab'd.....	\$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%.....	\$35.00 to \$37.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$85.00 to \$87.50
75%	145.00 to 150.00
Per Gross Ton	
	Furnace
10%	\$35.00
11%	37.00
12%	\$39.00
14 to 16%	\$45 to 46.00

Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio Furnace	
	Per Gross Ton
10%	\$34.00
11%	36.00
12%	\$38.00

Silvery Iron	
F.o.b. Jackson County, Ohio Furnace	
	Per Gross Ton
6%	\$26.50
7%	27.50
8%	28.50
9%	30.00
10%	\$32.00
11%	34.00
12%	36.00

Other Ferroalloys	
Ferrotungsten, per lb. contained metal, del'd	\$1.05 to \$1.10
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.50c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.25 to \$4.00
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads.....	\$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per net ton.....	\$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per net ton.....	\$122.50

Fluxes and Refractories	
Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines.....	\$18.00
No. 2 lump, Illinois and Kentucky mines..	\$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid, \$17.00 to \$17.50	
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silica, f.o.b. Illinois and Kentucky mines.....	\$32.50

Fire Clay	
Per 1000 f.o.b. Works	
	High Duty Moderate Duty
Pennsylvania	\$40.00 to \$43.00 \$38.00 to \$40.00
Maryland	43.00 to 46.00 38.00 to 40.00
New Jersey.....	55.00 to 75.00
Ohio	40.00 to 43.00 38.00 to 40.00
Kentucky	40.00 to 43.00 38.00 to 40.00
Illinois	40.00 to 43.00 35.00 to 38.00
Missouri	40.00 to 43.00 35.00 to 38.00
Ground fire clay, per ton.....	6.50 to 7.50

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$40.00 to \$45.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton.....	\$8.00 to 9.00

Magnesite Brick	
Per Net Ton	
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.....	40.00

Chrome Brick	
Per Net Ton	
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
(Less-than-Carload Lots)	
(F.o.b. Pittsburgh, Cleveland, Birmingham and Chicago)	
	Per Cent Off List
Machine bolts, small, rolled threads....	60 and 10
Machine bolts, all sizes, cut threads.....	50, 10 and 10
Carriage bolts, smaller and shorter, rolled threads	50, 10 and 10
Carriage bolts, cut threads, all sizes.....	50 and 10
Eagle carriage bolts.....	65 and 10
Lag bolts	60, 10 and 10
Plow bolts, Nos. 3 and 7 heads.....	50 and 10
(Extra of 20% for other style heads)	
Machine bolts, c.p.c. and t. nuts, 1/2 x 4 in., 45, 10 and 5	
Larger and longer sizes.....	45, 10 and 5
Bolt ends with hot-pressed nuts.....	50, 10 and 10
Bolt ends with cold-pressed nuts.....	45, 10 and 5
Hot-pressed nuts, blank and tapped, square, 4.00c. per lb. off list	
Hot-pressed nuts, blank or tapped, hexagons, 4.40c. per lb. off list	
C.p.c. and t. square or hex. nuts, blank or tapped	4.10c. per lb. off list
Washers*	6.75c. to 6.50c. per lb. off list

*F.o.b. Chicago and Pittsburgh.
The discount on machine, carriage and lag bolts is 5 per cent more than above for car lots. On hot-pressed and cold-pressed nuts the discount is 25c. more per 100 lb. than quoted above for car lots.

Bolts and Nuts	
(Quoted with actual freight allowed up to but not exceeding 50c. per 100 lb.)	
Per Cent Off List	
Semi-finished hexagons nuts:	
1/2 in. and smaller, U. S. S.	80, 10, 10 and 5
3/4 in. and larger, U. S. S.	75, 10, 10 and 5
Small sizes, S. A. E.	80, 10, 10, 10 and 5
S. A. E., 1/2 in. and larger.....	75, 10, 10, 10 and 5
Stove bolts in packages.....	80, 10 and 5
Stove bolts in bulk	80, 10, 5 and 2 1/2
Tire bolts	60 and 5

Semi-Finished Castellated and Slotted Nuts	
(Actual freight allowed up to but not exceeding 50c. per 100 lb.)	
(To jobbers and consumers in large quantities)	
	Per 100 Net S.A.E. U.S.S.
1/4-in.....	\$0.44 \$0.44
1/2-in.....	0.515 0.515
3/4-in.....	0.62 0.66
1-in.....	0.79 0.90
1 1/4-in.....	1.01 1.05
1 1/2-in.....	1.38 1.42
2-in.....	1.70 1.73
1/4-in.....	\$2.35 \$2.40
1/2-in.....	3.60 3.60
3/4-in.....	5.65 5.80
1-in.....	8.90 8.90
1 1/4-in.....	12.60 13.10
1 1/2-in.....	18.35 18.35
2-in.....	21.00 21.00

Larger sizes.—Prices on application.

Large Rivets	
Base Per 100 Lb.	
F.o.b. Pittsburgh	\$2.40 to \$2.60
F.o.b. Cleveland	2.70
F.o.b. Chicago.....	\$2.60 to 2.75

Small Rivets	
Per Cent Off List	
F.o.b. Pittsburgh.....	70, 10 and 5 to 70 and 10
F.o.b. Cleveland.....	70, 10 and 5 to 70 and 10
F.o.b. Chicago.....	70, 10 and 5 to 70 and 10

Cap and Set Screws	
(Freight allowed up to but not exceeding 50c. per 100 lb.)	
Per Cent Off List	
Milled cap screws.....	80 and 10
Milled standard set screws, case hardened, 80 and 5	
Milled headless set screws, cut thread.....	80
Upset hex. head cap screws, U. S. S. thread, 80, 10 and 10	
Upset hex. cap screws, S.A.E. thread, 80, 10 and 10	
Upset set screws.....	80, 10 and 5
Milled studs	70 and 5

Chicago

Railroad Cars to Take 360,000 Tons of Steel—Ingot Output Slightly Lower

CHICAGO, Dec. 14.—Car builders in the Middle West are now figuring on 15,000 cars, and they believe that this number will be increased by 10,000 at an early date. In addition, the railroads themselves are quietly arranging for steel for the construction and repair of cars in their own shops. Adding car builders' specifications to those of the railroads, not less than 210,000 tons of car material is now being inquired for in this territory. This is the equivalent of about 21,000 cars. Producers believe that they will be called upon at an early date to quote on an additional 150,000 tons for car construction purposes. The Pennsylvania is said to have placed 60 electric cars, and the Rock Island freight car inquiry is active, with the possibility that orders will be placed this week.

Steel output is not far below that of last week, but with specifications of small size and at the same time numerous, rolling schedules are being rotated more frequently and operation on the whole is less satisfactory. Shipments, except of standard-section rails, are tending downward. Mills are meeting the situation by paring ingot production, which is now a trifle over 80 per cent of capacity. In the meantime blast furnace output remains steady, with some mills adding to stocks of iron on the ground and others seeking orders for basic iron.

Fresh inquiry for structural material is light, and contractors appear to be in no hurry to make awards, with the result that the volume of business before the trade remains practically at the figure of a week ago. The general run of steel business, with the exception of that emanating from the railroads, is lighter, but this fact does not appear to have affected prices.

Pig Iron.—With the pig iron market active only in spots, there are indications of keener competition, and Northern foundry iron is less firm at \$21, base local furnace. The market is steady to the east of Chicago, but in other directions and even in the Chicago switching district the determination of dealers to get business has resulted in a few scattered sales on which prices were a shade below the general market. With steel mill operations at a lower rate, there is a ready supply of basic iron, which is being taken at close to \$20.50. An Indianapolis user has purchased, through a Cincinnati dealer, 3000 tons of malleable, and a melter in Chicago has placed at \$21, base local furnace, 5000 tons of foundry iron for first quarter delivery. From 5000 to 10,000 tons of basic iron is to be bought in this market by a user with several plants outside of Chicago. Two sales of basic iron of 500 tons each, one for a Chicago and one for a Wisconsin melter, are reported. A foundry south of Chicago is in the market for 3000 tons of Northern iron. The melt in this district is holding fairly steady, but shipments are slowing down because of contemplated curtailment of production during the holidays.

Quotations on Northern foundry, high phosphorus and malleable iron are f.o.b. local furnace, and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards:

Northern No. 2 foundry, sil. 1.75 to 2.25	\$21.00
Northern No. 1 foundry, sil. 2.25 to 2.75	21.50
Malleable, not over 2.25 sil.	21.00
High phosphorus	21.00
Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	27.04
Southern No. 2 (all rail)	26.01
Southern No. 2 (barge and rail)	24.18
Low phos., sil. 1 to 2 per cent, copper free	\$31.50 to 32.50
Silvery, sil. 8 per cent.	33.29
Bessemer ferrosilicon, 14 to 15 per cent	46.79

Plates.—Pending railroad business is adding strength to the plate situation here, and the Chicago price of 2.10c. appears to have become firmer during the week. Competition for business in the Southwest is unusually keen. Users in that territory are making

good use of the fabrication-in-transit privilege, and therefore are often able to improve upon the Chicago base quotation. The demand for oil storage tanks is less active, bookings this week totaling less than 3000 tons. Inquiry for tanks aggregates about 8000 tons, for which buyers do not appear to be in any great hurry. Tank builders are booked close to five weeks ahead, but in view of liberal specifications sent to mills and less active inquiry, it looks as though shops will soon be in need of new work if present operations are to be maintained. Chicago district mills are quoting on steel for 21,000 cars, and it is believed that at least 14,000 cars will be added to that number before or shortly after the beginning of the new year. The trade now understands that the Illinois Central inquiry will call for 8000 cars. The Santa Fe is asking for prices on 150 sulphur cars, which are of the gondola type with all members of the underframe made of cast steel. Two electric railroads operating out of Chicago are in the market for 25 motor cars and 10 trailers, and the Santa Fe is preparing specifications for 1000 refrigerator cars. The St. Paul inquiry has been cut from 1500 cars to 500 automobile and 500 stock cars. The receivers for that railroad have been authorized to negotiate for this equipment, and contracts are expected to be closed this week.

The mill quotation on plates is 2.10c. per lb., base, Chicago.

Ferroalloys.—On the whole, this market is quiet, sales being small and not of the order that test prices. Several hundred tons of German ferromanganese is available at New Orleans, and this is being quoted at \$95, seaboard.

We quote 80 per cent ferromanganese, \$107.56, delivered Chicago; 50 per cent ferrosilicon, \$85, delivered; spiegeleisen, 18 to 22 per cent, \$44.56, delivered Chicago.

Structural Material.—Business in prospect has not been added to in any great volume this week. Outstanding tonnage is large, but contractors show no desire to make awards promptly. A court house at Denver is being held up pending a ballot on a bond issue. The American Bridge Co. is low bidder on 2200 tons for a power house for the Standard Oil Co., Whiting, Ind. The Chicago Bridge & Iron Works entered the low bid for 750 tons for a waterworks crib for Chicago. Specifications to mills from fabricators are smaller in total volume. Mill deliveries have now reached a point where prompt shipment can be made on some sections, whereas three weeks' notice is required on others. Prospective railroad equipment buying is encouraging mills to hold firmly to the Chicago quotation of 2.10c.

The mill quotation on plain material is 2.10c. per lb. base, Chicago.

Bars.—Specifications to mills for soft steel bars are heavier from some sources, notably the automotive and agricultural industries, but on the whole the demand for bars is less active. Specifications are not equal to shipments, and forward buying is sluggish, although there is a growing feeling that unusually low inventories in the hands of consumers, coupled with a good car-building movement, may extend deliveries. The market is not being tested by large inquiries or orders, but the Chicago price of 2.10c. is firm on such business as is being taken. Shipping orders for alloy steel bars are more numerous, and prices for that commodity are steady. Iron bars are quiet, and there has been no real test of the market, which is nominally quoted at 2c., Chicago. The demand for iron bars is gradually narrowing. Earlier in the year the Santa Fe changed over to mild steel for all purposes for which iron bars had formerly been used. Shipments of rail steel bars are tending to increase. New bookings so far in December are running ahead of those for November. In some cases immediate shipment is requested. Although a few first quarter contracts have been entered, there is less activity in this respect than a year ago. Mills believe this to be due to the steadiness of prices and the ability of users to get deliveries on short notice. Rail steel mills in this district continue to operate on double turn, with about 20 per cent of production used to build up fence post stocks, and 80 per cent shipped on current orders and speci-

fications. Chicago prices of rail steel bars are steady at 1.90c. for desirable tonnages and 2c. for average and small lots.

Mill prices per lb. are: Mild steel bars, 2.10c., base, Chicago; common bar iron, 2c. base, Chicago; rail steel bars, 1.90c. to 2c., base, Chicago.

Wire Products.—Specifications from the manufacturing trade show an upward trend, but are not yet heavy enough to warrant an increase in the rate of mill operations, which stand at close to 50 per cent.

Rails and Track Supplies.—Chicago district rail mills are running at close to 75 per cent of capacity. Little or no track work will be done this winter, and the present rate of shipments is explained by the desire of the railroads to have ample stocks to get track-laying programs started early in the spring and to maintain those schedules throughout the early part of 1927. Track accessory business is a feature of this market. Three railroads, one operating east from Chicago and two west, have closed for 25,000 tons of track supplies. Inquiry, much of which is fresh this week, also totals 25,000 tons. The Pennsylvania is said to have placed contracts for tie plates, spikes and bolts, but announcement of the distribution has not been made.

Standard Bessemer and open-hearth rails, \$43; light rails, rolled from billets, \$36 to \$38 per gross ton, f.o.b. maker's mill.

Standard railroad spikes, 2.90c. per lb. mill; track bolts with square nuts, 3.90c. mill; steel tie plates, 2.35c. mill; angle bars, 2.75c. mill.

Bolts, Nuts and Rivets.—Specifications are in smaller volume. First quarter contracting is well under way at the prices that have prevailed during the current quarter.

Reinforcing Bars.—Awards are more numerous but for the most part they are of the order of 100 tons and under. Fresh inquiry is light and dealers' efforts are largely being centered on refiguring projects that have been before the trade for three or four months. Shops are operating close to 50 per cent of capacity, with the tendency downward. Recent awards and new projects now before trade are shown on page 1715.

Cast Iron Pipe.—Awards of pipe during the last few weeks have been confined to small individual tonnages, and no real test of prices has been made. Such orders as have been taken, however, have been at prices within the range of \$39 to \$40, Birmingham, for 6-in. and larger diameters. This indicates a weakness in prices, since November quotations for small tonnages were higher than \$40, Birmingham. Deliveries continue to improve, and practically all makers are now able to make immediate shipments on several sizes. Minneapolis will close this week on 1700 tons of 6, 8, 12 and 24-in. pipe, and Macomb, Ill., will receive bids up to Dec. 28 on 700 tons of 12-in. Class B pipe. Holding companies with headquarters in the East who operate utility properties in the Central West are making inquiry for a fair tonnage of pipe. Chicago representatives of pipe makers estimate that orders taken

in the Chicago district for 1926 will be close to the total for 1925.

We quote per net ton, delivered, Chicago, as follows: Water pipe, 4-in., \$51.20 to \$52.20; 6-in. and over, \$47.20 to \$48.20; Class A and gas pipe, \$4 extra.

Sheets.—Sheet prices in the Chicago territory are steady. Buying in large amounts or for advance requirements is slow, and prices are not being given a real test. Competition in the Southwest is keen, and prices in that territory are easier. The demand here is fairly steady, and mill operations are at close to 80 per cent of capacity. However, with current orders light, backlogs are rapidly being reduced and deliveries are improving. Shipments can now be had in from 10 days to three weeks, depending upon the product and the gage, the lighter gages being in the greatest demand. The situation is shaped for at least a partial shutdown of sheet mills during the holiday period, and this is being planned by some producers.

Chicago delivered prices from mill are 3.25c. for No. 24 black; 2.55c. for No. 10 blue annealed; 4.10c. for No. 24 galvanized. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Coke.—This market is steady at current quotations, which are for delivery this year. Local producers have not announced contract prices for 1927.

Hot-Rolled Strip.—Specifications show some improvement from the automotive trade.

Old Material.—The market is without feature, and quotations are nominal. Users are showing no interest in adding to stocks at this time, and dealers are able to sell only in carload lots. In the main, users are well stocked considering the current rate of operations, and they believe that the supply of scrap in this territory exceeds the demand. Reasoning from that angle, the average buyer is unconcerned by dealers' opinions of the probable trend of the market early next year. The last mill sale of heavy melting steel was at \$13.50 per gross ton, delivered. Users are now out of the market, and the only purchases of this grade are by dealers who have past obligations to fulfill. The Rock Island is offering 1000 tons of re-rolling rails, and the Santa Fe will sell 500 tons of the same grade. The supply of old rails is more than ample for current requirements, and prices are weaker. A small tonnage of re-rolling rails brought \$16.25 per gross ton, delivered. Railroad offerings are numerous.

We quote delivered in consumers' yards, Chicago and vicinity, all freight and transfer charges paid for all items, except relaying rails, including angle bars to match, which are quoted f.o.b. dealers' yards:

Per Gross Ton

Heavy melting steel	.....	\$13.00 to \$13.50
Frogs, switches and guards, cut apart, and miscellaneous rails	.....	14.50 to 15.00
Shoveling steel	.....	13.00 to 13.50
Hydraulic compressed sheets	.....	11.00 to 11.50
Drop forge flashings	.....	9.50 to 10.00
Forged cast and rolled steel car-wheels	.....	16.50 to 17.00
Railroad tires, charging box size	.....	17.50 to 18.00
Railroad leaf springs, cut apart	.....	16.50 to 17.00
Steel couplers and knuckles	.....	15.50 to 16.00
Coil springs	.....	17.25 to 17.75
Low phosphorus punchings	.....	15.50 to 16.00
Axle turnings, foundry grade	.....	13.00 to 13.50
Axle turnings, blast fur. grade	.....	11.00 to 11.50
Relaying rails, 56 to 60 lb.	.....	25.50 to 26.50
Relaying rails, 65 lb. and heavier	.....	26.00 to 31.00
Rerolling rails	.....	16.25 to 16.75
Steel rails, less than 3 ft.	.....	16.25 to 16.75
Iron rails	.....	13.50 to 14.00
Cast iron borings	.....	9.50 to 10.00
Short shoveling turnings	.....	9.50 to 10.00
Machine shop turnings	.....	6.50 to 7.00
Railroad malleable	.....	16.00 to 16.50
Agricultural malleable	.....	15.00 to 15.50
Angle bars, steel	.....	15.00 to 15.50
Cast iron carwheels	.....	14.50 to 15.00

Per Net Ton

No. 1 machinery cast	.....	16.00 to 16.50
No. 1 railroad cast	.....	15.50 to 16.00
No. 1 agricultural cast	.....	15.50 to 16.00
Stove plate	.....	14.00 to 14.50
Grate bars	.....	13.50 to 14.00
Brake shoes	.....	13.00 to 13.50
Iron angle and splice bars	.....	14.00 to 14.50
Iron arch bars and transoms	.....	18.75 to 19.25
Iron car axles	.....	22.00 to 22.50
Steel car axles	.....	17.00 to 17.50
No. 1 railroad wrought	.....	12.00 to 12.50
No. 2 railroad wrought	.....	11.50 to 12.00
No. 1 busheling	.....	10.25 to 10.75
No. 2 busheling	.....	6.25 to 6.75
Locomotive tires, smooth	.....	16.00 to 16.50
Pipes and flues	.....	9.00 to 9.50

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	..... 3.10c.
Mild steel bars	..... 3.00c.
Reinforcing bars, billet steel	..... 2.25c. to 2.60c.
Cold-finished steel bars and shafting—	
Rounds and hexagons	..... 3.60c.
Flats and squares	..... 4.10c.
Hoops	..... 4.15c.
Bands	..... 3.65c.
No. 24 black sheets	..... 3.95c.
No. 10 blue annealed sheets	..... 3.50c.
No. 24 galvanized sheets	..... 4.80c.
Standard railroad spikes	..... 3.55c.
Track bolts	..... 4.55c.
Structural rivets	..... 3.50c.
Boiler rivets	..... 3.70c.
	Per Cent Off List
Machine bolts	..... 50 and 5
Carriage bolts	..... 47½
Coach or lag screws	..... 55 and 5
Hot-pressed nuts, squares, tapped or blank,	3.25c. off per lb.
Hot-pressed nuts, hexagons, tapped or blank,	3.75c. off per lb.
No. 8 black annealed wire, per 100 lb.	..... \$3.30
Common wire nails, base per keg	..... 3.05
Cement coated nails, base per keg	..... 3.05

New York

Inquiry for 6200 Tons of Gas Pipe— Indifference Toward Steel Needs

NEW YORK, Dec. 14.—Sales of pig iron by local brokers during the past week totaled about 6500 tons. Of that amount, however, 1500 tons was for delivery in the Philadelphia district and another 1500 tons was charcoal iron. The market is unusually quiet, and with the holiday shutdowns approaching, foundries are not expected to take much interest in buying until after the first of next year. While melt is decreasing, the curtailment of operations is no sharper than usual for this season, and business prospects for foundries during the early part of 1927 are said to be promising. Estimates of the amount of iron contracted for during the recent buying movement are being revised. It is now thought that melters did not cover for more than 65 per cent of their first-quarter requirements, as against an original estimate of 80 per cent. Inquiry is almost entirely absent, and current sales are confined largely to small tonnages for prompt shipment. A New Jersey manufacturer of printing presses has entered the market for 300 tons of No. 1X iron for first-quarter delivery. The Ford Motor Co., Detroit, has bought 200 tons of No. 1X for export. Pending inquiries are not sufficiently attractive to give prices a real test. It has been learned, however, that the barge rate on the Buffalo iron recently purchased by a Port Chester, N. Y., melter was \$1 lower than first reported. This means that the base price at the furnace was \$19. The low rate was made because of the desire of the barge line to get a haul on its final trip from Buffalo to New York.

We quote per gross ton delivered in the New York district as follows, having added to furnace prices \$1.39 to \$2.52 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.54 from Virginia:

East. Pa. No. 2 fdy., sil. 1.75 to 2.25	\$23.89 to \$24.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	24.39 to 25.02
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	24.80 to 25.52
Buffalo fdy., sil. 1.75 to 2.25 (all rail)	22.91 to 23.91
No. 2 Virginia fdy., sil. 1.75 to 2.25	28.04 to 29.54

Ferroalloys.—Very little is heard in this district of contracting for ferromanganese for 1927 consumption, although it is known that considerable business is before the market for that delivery. There have been a few sales of carload and small lots of ferromanganese and spiegeleisen at the prevailing prices of \$100, seaboard or furnace, for the former and \$37, furnace, for the latter.

Warehouse Business.—Despite the approach of the holiday season there is a good volume of orders, but the tonnages required are small. Reports of shading on black and galvanized sheets continue, but quotations lower than the current schedule of prices are apparently confined to occasional sales by dealers with incomplete stocks. Inquiry for structural material has declined to small lots to complete buildings in process of construction.

Finished Steel.—Buying continues at a rate somewhat less than that of November. Stocks in the hands of consumers are generally believed to be very low, and replenishment buying is expected within the next two or three weeks. Some jobbers' stocks are larger, however, than usual at this time of year, due to the slowness with which material has been moved in the last few weeks. Despite the slump in sales volume, the only steel products in which price weakness appears are sheets and cold rolled strip. Blue annealed, black and galvanized are being sold occasionally at 2.25c., 2.95c. and 3.80c., Pittsburgh, respectively, for immediate delivery, but on first quarter contracts mills are asking \$1 a ton above these prices. Sheet buying as well as that of alloy steels is not expected to show improvement until after the automobile shows early in the year. A conspicuous feature of the present situa-

tion is the indifference of buyers as to first quarter contracts. Some, of course, are being made, but a considerable proportion of buyers takes the view that while prices generally will not change in first quarter, there is more likelihood of declines than advances; hence, there is little to be gained in making commitments now. Not a few buyers of steel bars who bought heavily last summer at 1.90c., Pittsburgh, are still using bars shipped at that price and are hesitating with regard to contracts at 2c. Their policy, it seems, is to wait. Concessions from 2c. on bars may recently have been given to a few special buyers, but the bulk of the trade is paying 2c. Sales of lap-weld steel pipe continue at a fairly high rate, delivery promises of mills usually being three or four weeks. Butt-weld pipe is moving less actively, but demand is slightly better than was the case a month ago. In structural steel the largest local award is 11,500 tons for subway construction. An office building at 2 Park Avenue,

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.34c.
Soft steel bars and small shapes	3.24c.
Iron bars	3.24c.
Iron bars, Swedish charcoal	7.00c. to 7.25c.
Cold-finished steel shafting and screw stock—	
Rounds and hexagons	4.00c.
Flats and squares	4.50c.
Cold-rolled strip, soft and quarter hard	6.25c.
Hoops	4.49c.
Bands	3.99c.
Blue annealed sheets (No. 10 gage)	3.89c.
Long terme sheets (No. 24 gage)	5.80c.
Standard tool steel	12.00c.
Wire black annealed	4.50c.
Wire, galvanized annealed	5.15c.
Tire steel, 1½ x ¼ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

Per Cent Off List

Machine bolts, cut thread	40 and 10
Carriage bolts, cut thread	30 and 10
Coach screws	40 and 10

	Per 100 Ft.
Boiler Tubes—	
Lap welded steel, 2-in.	\$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt.	46	29
¾-in. butt.	51	37
1-in. butt.	53	39
2½-6-in. lap.	48	35
7 and 8-in. lap.	44	17
11 and 12-in. lap.	37	12
Wrought Iron—		
½-in. butt.	4	+19
¾-in. butt.	11	+9
1-1½-in. butt.	14	+6
2-in. lap.	5	+14
3-6-in. lap.	11	+6
7-12-in. lap.	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	\$6.45	\$6.20
Charcoal, per box—	A	AAA
IC	\$9.70	\$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	\$10.00 to \$11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25
Sheets, Box Annealed—Black, C. R. One Pass	

	Per Lb.
Nos. 18 to 20	4.15c.
No. 22	4.30c.
No. 24	4.35c.
No. 26	4.45c.
No. 28*	4.60c.
No. 30	4.85c.

Sheets, Galvanized

	Per Lb.
No. 14	4.50c. to 4.75c.
No. 16	4.60c. to 4.85c.
No. 18	4.75c.
No. 20	4.90c.
No. 22	4.95c.
No. 24	5.10c.
No. 26	5.35c.
No. 28*	5.60c.
No. 30	6.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

now up for bids, will take 9000 tons. A large office building to be erected just north of Grand Central Terminal has not openly come into the market, but the tonnage of steel required has been estimated at 20,000 to 25,000 tons. The Norfolk & Western Railroad has ordered 2000 gondola cars, and bids have gone in to several other railroads this week on recent large inquiries. Bookings of fabricated structural material in the Greater New York territory during November, as reported to the Structural Steel Board of Trade, totaled 26,600 tons, as compared with 30,750 tons in October and 58,000 tons in November, 1925.

T. A. Gillespie & Co., 7 Dey Street, New York, makers of lock-bar pipe, were low bidders on 23,740 ft. (about 2200 tons) of 30-in., 36-in., 42-in. and 48-in. steel pipe for the water supply system of Kearny, N. J.

We quote mill shipments, New York delivery, as follows: Soft steel bars, 2.34c. per lb.; plates, 2.24c.; structural shapes, 2.34c.; bar iron, 2.24c.

Coke.—There is a good volume of inquiry for furnace coke, a total of about 20,000 tons, and there is from 2000 to 3000 tons of foundry coke inquiry in this district. Contract prices continue unchanged, but distress tonnages of foundry are quoted at \$4.75 to \$5.25 and furnace coke is quotable at \$3.50 to \$4 per net ton, Connellsville. By-product coke is unchanged at \$10.59 to \$11.77 per ton, delivered Newark, or Jersey City, N. J.

Old Material.—Prices of all grades of scrap continue unchanged. The quietness of business that usually accompanies the holiday season and the year end is most pronounced. Activity is confined almost exclusively to the shipment of small lots of heavy melting steel and borings and turnings. No. 1 heavy melting steel is going forward to consumers at Coatesville and Bethlehem, Pa., at \$15.50 per ton, delivered, and a Pottsville, Pa., mill is still receiving small tonnages of yard steel. Borings and turnings are going forward to Bethlehem and Steelton, Pa. While current offering prices of brokers are bringing out only a small tonnage of material, the general slackness is attributed in large part to the inertia of the market expected at this season.

Buying prices per gross ton, New York, follow:

Heavy melting steel (yard)....	\$9.25 to \$9.75
Heavy melting steel (railroad or equivalent).....	11.75 to 12.85
Rails for rolling.....	12.50 to 13.00
Steel car axles.....	18.50 to 19.00
Iron car axles.....	24.00 to 24.50
No. 1 railroad wrought.....	13.00 to 14.00
Forge fire.....	9.25 to 9.75
No. 1 yard wrought, long.....	12.00 to 13.00
Cast borings (steel mill).....	9.25 to 9.75
Cast borings (chemical).....	13.00 to 13.50
Machine shop turnings.....	9.25 to 9.75
Mixed borings and turnings.....	9.25 to 9.75
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	9.75 to 10.25
Stove plate (steel mill).....	9.25 to 9.75
Stove plate (foundry).....	11.00 to 11.50
Locomotive grate bars.....	10.25 to 10.75
Malleable cast (railroad).....	15.50 to 16.00
Cast iron carwheels.....	12.00 to 12.50
No. 1 heavy breakable cast.....	11.75 to 13.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast.....	\$16.00 to \$16.50
No. 1 heavy cast (columns, building materials, etc.), cupola size 14.50 to 15.00	
No. 2 cast (radiators, cast boilers, etc.).....	13.50 to 14.00

Reinforcing Bars.—Concrete reinforcing bars for the Lincoln Highway viaduct in Newark have been divided, 680 tons having been purchased from Igoe Brothers and 340 tons from Joseph T. Ryerson & Son, Inc. No other sizable jobs have been let, and business is seasonably dull. Prices, however, do not seem to be showing any weakness. In fact, there is a movement on the part of some producers to strengthen the price of 2.10c., Pittsburgh, on shipments of less than 100 tons, a price that has been shaded at times to meet the 2c. quotation on large orders. Import figures show that foreign bars have not been coming into New York in any considerable quantities, although some large tonnages have been landed at Southern ports and in New England. The majority of the Youngstown warehouses continue to quote 2.50c., or 2.87½c., delivered New York, and no cases of shading the New York warehouse price of 3.15c., delivered at job, have been reported in the last week.

Cast Iron Pipe.—A distinct tendency toward softness of prices is developing on practically all sizes of pipe. Competition for current business is keen, with makers offering the usual concessions for winter delivery. In addition to the gas pipe inquiries from the United Gas Improvement Co., Philadelphia, and the Consolidated Gas Co., New York, the past week brought out specifications from the Brooklyn Union Gas Co., Brooklyn, N. Y., for about 6200 tons of 6, 8, 10 and 12-in. gas pipe. While not exercising a direct effect on the Northern market for pipe, the low basis recently quoted by some Birmingham makers is a considerable factor in the South. Effective Jan. 1, the less-than-carload freight rate on pipe from Birmingham to New York will be advanced to \$16.20 per net ton. The carload rate continues at \$9.25 per net ton.

We quote pressure pipe per net ton, f.o.b. New York in carload lots, as follows: 6-in. and larger, \$49.60 to \$50.60; 4-in. and 5-in., \$54.60 to \$55.60; 3-in., \$64.60 to \$65.60; with \$5 additional for Class A and gas pipe.

Cleveland

Railroad Places 9400 Tons of Bridge Work—Sheets and Strips Soft

CLEVELAND, Dec. 14.—Business in finished steel is holding up to about recent volume, with the demand confined for the most part to small lots for early January shipment. Plates and structural material are apparently moving somewhat better than steel bars. Some of the mills expect that their December orders will show a little gain over those of November. Several Michigan automobile companies are feeling the market, particularly on sheets for January shipment, and have released specifications for alloy steel bars. On the other hand, some of the motor car builders have suspended shipments because their plants will be shut down shortly for inventories. Small consumers are placing first-quarter contracts quite freely for plates, and some contracts are being taken for steel bars for that delivery, although bar consumers as a rule are not yet showing any interest in contracts. While 1.90c., Cleveland, is quoted on steel bars and even that price has been shaded, mills outside of Cleveland are holding to 2c., Pittsburgh. A Cleveland producer is reported to be soliciting business in the Chicago territory. Plates are firm at 1.90c., Pittsburgh, at which first-quarter contracts are being taken, and structural material is holding to 2c., Pittsburgh. A northern Ohio manufacturer of car tanks has placed 2200 tons of plates with a Cleveland mill. In the structural field the Chesapeake & Hocking Valley Railroad has placed 9400 tons of steel for bridge work with two fabricators. New structural inquiry is light.

Pig Iron.—Some small-lot sales are being made, mostly for early shipment, but the aggregate tonnage booked continues very light. However, one producer reports an improvement in the volume of inquiry. The automotive industry is taking iron somewhat more freely than last month but is deferring placing orders for the first quarter. Although shipments of considerable iron have been held up, some of the producers report that their suspended tonnage is no larger than is usual at this time of the year. Jobbing foundries have slowed down, but the falling off in their business

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes.....	3.00c.
Mild steel bars.....	3.00c.
Cold-finished rounds and hexagons.....	3.90c.
Cold-finished flats and squares.....	4.40c.
Hoops and bands.....	3.65c.
No. 24 black sheets.....	3.80c.
No. 10 blue annealed sheets.....	3.25c.
No. 24 galvanized sheets.....	4.65c.
No. 9 annealed wire, per 100 lb.....	\$3.00
No. 9 galvanized wire, per 100 lb.....	3.45
Common wire nails, base, per keg.....	3.00

is regarded as largely seasonal. With the limited buying, there is no testing of prices, and producers are showing no disposition to shade ruling quotations to stimulate business. Cleveland furnaces quote foundry and malleable iron at \$20, furnace, for Cleveland delivery and \$19 for outside shipment. Quotations by other Lake producers range from \$19 to \$19.50, furnace. In the Valley district \$19, furnace, appears to be the more common price. For Michigan delivery the furnace price is \$20.50. A Valley producer that will blow in shortly on low phosphorus iron has opened its books for the first quarter at \$28, furnace, and has made several sales for that delivery.

Quotations below are per gross ton and except on basic and low phosphorus iron, are delivered Cleveland, including a 50c. switching charge for local iron. Ohio silvery and Southern iron prices are based on a \$3.00 freight rate from Jackson and \$6.01 from Birmingham:

Basic, Valley furnace.....	\$18.50
Northern No. 2 fdy., sil. 1.75 to 2.25	20.50
Southern fdy., sil. 1.75 to 2.25...	26.01
Malleable	20.50
Ohio silvery, 8 per cent.....	31.50
Standard low phos., Valley furnace	28.00

Semi-Finished Steel.—Bessemer sheet bars have been offered at \$34, Pittsburgh, for prompt shipment, but with this exception regular quotations are being adhered to. The ruling prices are being quoted for the first quarter, but consumers are showing little interest in making future commitments, and specifications are light, reflecting the slowing down of the consuming mills.

Sheets.—The market shows no improvement either from the standpoint of price or volume. While some consumers are placing small lots for quick shipment, others are holding up shipments until January. Some mills continue to make concessions to get early shipment orders. The common range on black sheets is 2.90c. to 3c., Pittsburgh, although 2.85c. is being quoted. Some mills that have been trying to hold to the 3.10c., Pittsburgh base, have finally gone to 3c. On blue annealed sheets there are quotations as low as 2.25c., Valley mill. Galvanized sheets can be bought in car lots at 3.85c., Valley mill, for first quarter, and it is reported that this price is being shaded for early shipment. Automobile body sheets are firm.

Strip Steel.—Some first quarter contracts for cold-rolled strip steel have been taken at 3c., Cleveland, which is regarded as the minimum price for round lots, although tube stock is selling at as low as 2.90c. For small lots of cold-rolled strip, prices range from 3.25c. to 3.40c. New demand both for cold-rolled and hot-rolled strip steel is light, and the regular prices on the latter are not being firmly adhered to. Shading of \$2 a ton to 2.20c., Pittsburgh, is reported on round lots of wide strip to buyers other than cold-rolled strip mills.

Reinforcing Bars.—While little new inquiry is coming out, several fair-sized lots are still pending. Regular prices are being well maintained in the absence of orders of sufficient size to test the market. Rail steel bars are quoted at 1.80c., mill.

Warehouse Business.—The weakness in mill prices on sheets is being reflected in some concessions in warehouse prices. Other prices are steady. Warehouse sales are lighter than in November.

Iron Ore.—The tendency of consumers during recent years to place less ore on docks and take more direct furnace yards is shown by a smaller dock balance at Lake Erie ports Dec. 1 than on that date for 20 years. The balance at Lake Erie docks Dec. 1 was 7,662,800 tons, as compared with 7,856,154 tons on the same date a year ago. The dock balance April 1 last was 5,490,622 tons. Receipts at Lake Erie ports during November were 3,282,270 tons and for the season until Dec. 1 were 42,170,699 tons, as compared with 38,596,823 tons for the same period last year. Shipments from these docks during November were 2,111,060 tons and for the season until Dec. 1 were 30,046,387 tons, as compared with 27,096,773 tons up to Dec. 1 last year.

Coke.—The market is inactive. There have been some suspensions of shipments of foundry coke by

automobile foundries, but most other consumers are taking all the coke they have contracted for and some will have enough to carry them well into the first quarter. Prices are unchanged at \$5 to \$5.50, ovens, for standard Connellsville makes. Heating coke is weaker, ranging from \$3 to \$3.50.

Bolts, Nuts and Rivets.—A price reduction has been made on semi-finished hexagon nuts by the addition of 10 per cent to the discount that has prevailed for a long time, and makers have opened their books for first quarter at the reduction. There is a fair volume of bolt and nut orders, but consumers are restricting their specifications to smaller lots than usual. Some first quarter contracts have been closed for bolts, nuts and rivets. The leading local rivet manufacturer is holding to \$2.60 per 100 lb. for large rivets and is not waiving the \$4 per ton extra on boiler rivets, as one Pittsburgh district maker is doing.

Ferroalloys.—Consumers are negotiating for ferromanganese contracts for the first half, but none of the large consumers in this territory has yet bought. Most users have contracted for ferrosilicon for next year.

Old Material.—Mills are showing no interest in buying scrap for January shipment, although they usually place some business at this time of the year for delivery in the following month. Current demand is at low ebb, as consumers are closely restricting shipments in order to keep their inventories down. Dealers are buying a limited amount of blast furnace scrap at \$11.25 for shipment to a Cleveland mill, but other grades are almost at a standstill. Heavy melting steel has declined 25c. a ton, but other prices are unchanged. While the market is untested, it does not have a weaker tone. This is attributed to the fact that local prices are rather low at present.

We quote per gross ton delivered consumers' yards in Cleveland:

Heavy melting steel.....	\$14.25 to \$14.50
Rails for rolling	16.25 to 16.50
Rails under 3 ft.....	16.50 to 17.00
Low phosphorus billet, bloom and slab crops.....	18.00 to 18.50
Low phosphorus sheet bar crops.....	16.50 to 17.00
Low phosphorus plate scrap.....	16.00 to 16.50
Low phosphorus forging crops.....	16.50 to 17.00
Cast iron borings	11.00 to 11.25
Machine shop turnings.....	9.00 to 9.25
Mixed borings and short turnings	11.00 to 11.25
Compressed sheet steel.....	13.50 to 14.00
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	14.00 to 14.50
Railroad malleable	16.50 to 17.00
Light bundled sheet stampings.....	12.00 to 12.50
Steel axle turnings	12.50 to 13.00
No. 1 cast	16.50 to 17.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling	11.00 to 11.25
Drop forge flashings, 15 in. and under	11.50 to 12.00
Railroad grate bars	12.50 to 13.00
Stove plate	12.50 to 13.00
Pipes and flues	10.00 to 10.50

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Tank steel plates, ¼-in. and heavier	2.80c. to 3.00c.
Tank steel plates, ⅜-in.....	3.00c. to 3.20c.
Structural shapes	2.75c. to 3.00c.
Soft steel bars, small shapes and iron bars (except bands).....	3.00c. to 3.20c.
Round-edge iron	3.50c.
Round-edge steel, iron finished, 1½ x 1½ in.....	3.50c.
Round-edge steel, planished....	4.30c.
Reinforcing steel bars, square, twisted and deformed.....	3.00c.
Cold-finished steel, rounds and hexagons	4.00c.
Cold-finished steel, squares and flats	4.50c.
Steel hoops	4.00c. to 4.25c.
Steel bands, No. 12 gage to ⅝-in., inclusive	3.75c. to 3.90c.
Spring steel	5.00c.
No. 24 black sheets	4.35c.
No. 10 blue annealed sheets.....	3.50c.
No. 24 galvanized sheets.....	5.30c.
Diamond pattern floor plates—	
¼-in.	5.30c.
⅝-in.	5.50c.
Rails	3.20c.
Tool steel	8.50c.
Swedish iron bars	6.60c.

Philadelphia

Foundry Iron Drops 50c.—Steel Contracts Forecast Sustained Consumption

PHILADELPHIA, Dec. 14.—Foundry pig iron has declined 50c. a ton on some sales, now being quoted at \$22, furnace, for the base grade, but not by all furnaces. Several furnaces are still quoting \$22.50. Competition from furnaces in other producing districts, particularly Buffalo, has forced the drop in price. In a moderate way consumers are placing contracts for steel for first quarter delivery, and when such contracts have been entered the tonnage provided for is usually the same as was taken in fourth quarter, indicating that manufacturing consumers anticipate that their first quarter business will not show any marked change. Many consumers are holding off, however, on the theory that prices probably will not be higher, and that there is little for them to gain in making commitments. Steel prices are holding fairly firm except in the case of sheets, tin mill black plate and cold-rolled strip.

Sales of heavy melting steel at \$16, delivered, have been made to one Eastern consumer, and another mill will probably be obliged to pay that price, having found it impossible to buy at \$15.50. There is so little activity in scrap, however, that no indications yet appear of any immediate general advance in prices.

Pig Iron.—As forecast in this column a week ago, eastern Pennsylvania producers of pig iron have not been content to permit furnaces in other districts to take business in this territory and have made concessions amounting to 50c. a ton to meet such competition, which comes principally from Buffalo and other New York State furnaces. Sales of foundry iron have been made at \$22, furnace, for the best grade. This quotation has not become general, as some quotations are still being made at \$22.50 where furnaces of this district have the advantage in freight rates. The volume of business done in foundry iron in the week was not large, but was somewhat better than in the two preceding weeks. Most of the sales were for first quarter, but in some cases deliveries were specified to be begun at once. Several thousand tons of low phosphorus iron was included in the week's business, as was also 1500 tons of cylinder iron for the Baldwin Locomotive Works. Foreign pig iron is less of a factor in this market than at any time this year. Brokers who have foreign iron to sell are making only slightly lower prices than on eastern Pennsylvania iron, and on some imported brands prices are about equal to those on domestic iron. One of the favorable features of the pig iron situation is the regularity with which foundries are taking iron, the tendency being to hurry shipments rather than to hold them up.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to \$1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$22.76 to \$23.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	23.26 to 23.76
East. Pa. No. 1X,	23.76 to 24.26
Basic delivered eastern Pa.	22.00 to 23.00
Gray forge	22.50 to 23.00
Malleable	23.50 to 24.00
Standard low phos. (f.o.b. New York State furnace)	24.00 to 25.00
Copper bearing low phos. (f.o.b. furnace)	25.00 to 26.00
*Virginia No. 2 plain, 1.75 to 2.25 sil.	27.67 to 28.67
*Virginia No. 2X, 2.25 to 2.75 sil.	28.17 to 29.17

*The freight rate from Virginia furnaces to Philadelphia is \$5.17 per gross ton.

Ferromanganese.—Apparently all factors in ferromanganese, domestic and English, are holding firmly to quotations of \$100, seaboard. Very little, if any, English ferromanganese has recently been sold in this market.

Billets.—Business is of moderate proportions, but prices are being fairly well held at \$35, Pittsburgh, for rerolling billets and \$40 for ordinary forging billets.

Plates.—Eastern plate mills are maintaining operations, averaging about 50 per cent. Current orders are in about the same volume as in recent weeks. Some contracts for first quarter are being entered. Continued steadiness of the price, 1.90c., Pittsburgh, is generally being taken for granted by consumers in contracting for first quarter. This price has now been in effect practically throughout the year, and at no time has plate business been equal to the capacity of the mills.

Structural Shapes.—An award of 4000 tons of fabricated steel for the office building of the Philadelphia Electric Co. has been made to the American Bridge Co. This company is also said to be low bidder on 10,500 tons for the Convention Hall at Atlantic City, the award of which will be announced soon. Previous estimates of the tonnage to be required for the building of the Fidelity-Philadelphia Trust Co. were possibly too low, the figure now being placed at 15,000 tons. Bids will soon be asked for. There has been a falling off this month in orders for plain material, and Eastern mills are feeling the need for tonnage. Prices are irregular, some mills in this and the Pittsburgh district holding for 2c., Pittsburgh, while other quotations are as low as 1.90c., Pittsburgh.

Bars.—Specifications against contracts and new business in steel bars have fallen off to such an extent that rolling mill schedules have felt the effects. Quotations for first quarter are 2c., Pittsburgh. Bar iron is still quoted at 2.22c., Philadelphia.

Sheets.—Concessions of \$1 and sometimes \$2 a ton on sheets are being offered by some mills for orders to be rolled immediately, but quotations for first quarter are generally 2.30c. for blue annealed, 3c. for black and 3.85c., Pittsburgh, for galvanized sheets. Current business is light Tin mill black plate has been sold at 3.15c., Pittsburgh.

Coke.—Owing to the continuance of the wage rates in the coke districts that have been in effect for some time, coke for first quarter will be higher. On Keystone foundry coke the first half contract price is \$6.25, ovens, and on Graceston coke \$7 is the announced price. Keystone coke was sold during this half at \$5. Ordinary grades of Connellsville coke are being offered at \$4.50 to \$5, ovens.

Imports.—Receipts of foreign material at Philadelphia last week dropped off sharply. No pig iron came in, and the only steel imports were 243 tons of structural shapes from Belgium and five tons of steel strips from England.

Old Material.—An Eastern steel company has bought a tonnage of heavy melting steel at \$16, delivered, and another mill probably will be obliged to pay this price, since it was unable to buy at its offered price of \$15.50. Brokers are offering \$15 and \$15.50 on old orders. The leading Eastern consumer has recently received heavy shipments of scrap and is rejecting cars somewhat more freely than usual. At Sparrows Point, Md., there is a congestion of scrap, and an embargo has been placed on all shipments. There is as yet no sign of a general advance in prices, but the market is slightly stiffer than a week ago.

We quote for delivery, consuming points in this district, as follows:

No. 1 heavy melting steel	\$15.50 to \$16.00
Scrap rails	15.50 to 16.00
Steel rails for rolling	17.00 to 17.50
No. 1 low phos., heavy, 0.04 per cent and under	20.00 to 21.00
Couplers and knuckles	18.50
Rolled steel wheels	18.50
Cast iron carwheels	16.50 to 17.00
No. 1 railroad wrought	17.00 to 17.50
No. 1 forge fire	13.00
Bundled sheets (for steel works)	13.00
Mixed borings and turnings (for blast furnace)	12.50 to 13.00
Machine shop turnings (for steel works)	13.00
Machine shop turnings (for rolling mill)	13.00 to 13.50
Heavy axle turnings (or equivalent)	14.00 to 14.50
Cast borings (for steel works and rolling mill)	13.50
Cast borings (for chemical plant)	15.00 to 16.00
No. 1 cast	17.00 to 17.50
Heavy breakable cast (for steel works)	16.00 to 16.50
Railroad grate bars	12.00 to 13.50
Stove plate (for steel works)	13.00 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	14.00 to 14.50
Shafting	21.00 to 22.00
Steel axles	23.00 to 24.00

Birmingham

Steel Backlogs Increasing—Forward Pig Iron Buying Negligible

BIRMINGHAM, Dec. 14.—Little buying of pig iron is under way, but production is steady with 10 blast furnaces producing foundry and 12 basic iron. Quotations are steady at \$20 per ton. A little improvement was noted the past week in the cast iron pipe trade but the furnace interests will go into the new year with a little iron sold. Several industries have signified bright prospects for the coming year; at the same time they indicate a policy of buying against probable needs only. In January the Sloss-Sheffield Steel & Iron Co. will blow in a North Birmingham furnace and blow out one of the City furnaces. The Tennessee Coal, Iron & Railroad Co. will have No. 6 furnace of the Ensley group in operation in February or by March 1.

We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 2 foundry, 1.75 to 2.25 sil.	\$20.00
No. 1 foundry, 2.25 to 2.75 sil.	20.50
Basic	20.00
Charcoal, warm blast	30.00

Rolled Steel.—Unfilled tonnage is increasing despite the active operation of mills and steady shipment of products. Requirements of steel making iron caused the Steel Corporation to switch one furnace to basic iron, making up in part the loss of such product caused by blowing out No. 6 Ensley furnace for relining and repairing. The Woodward Iron Co. is operating one furnace for steel making also. Plate and sheet are in good demand. Structural shapes, according to reports from fabricating shops, are not in as strong demand as a few weeks ago. Local business is good, several structures going up with local made and fabricated steel.

Coke.—Production is steady, practically all ovens at by-product plants being in operation. Contracts have been booked which will require delivery for some time. The Sloss-Sheffield Steel & Iron Co. is making betterments at its North Birmingham by-product coke plant, the Semet-Solvay Co. doing the work, by which the output will be increased around 30 per cent, from 1800 tons daily to 2300 tons. Work will be pushed on the 49 ovens to be added to the plant of the Alabama By-Products Corporation. The Tennessee Coal, Iron & Railroad Co. will during the coming year have its 77 additional Kopper ovens completed at Fairfield. Coke quotations are firm up to \$5.50 per ton, domestic foundry coke, with \$6 still asked on spot delivery.

Cast Iron Pipe.—The base price is now \$37 to \$38 on 6 in. and larger sizes. Sales showed a little improvement recently but market still is quiet. Winter business is expected to start in immediately after the holiday season and call for as much tonnage as last year. No cast iron pressure pipe stock is carried, shipments equaling the make.

Scrap.—Considerable scrap is moving, especially heavy melting steel, but prices are low with little fluctuation. Plenty of material is available, dealers say,

and consumers are having their instructions carried out as to deliveries. Some old material is still being used in blast furnace operations.

We quote per gross ton, f.o.b. Birmingham district yards, as follows:

Cast iron borings, chemical	\$15.00 to \$16.00
Heavy melting steel	13.00 to 14.00
Railroad wrought	11.00 to 12.00
Steel axles	17.00 to 18.00
Iron axles	17.00 to 18.00
Steel rails	13.00 to 14.00
No. 1 cast	16.00 to 17.00
Tramcar wheels	16.50 to 17.50
Carwheels	16.00 to 16.50
Stove plate	14.00 to 14.50
Machine shop turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Rails for rolling	15.00 to 16.00

St. Louis

Holiday Quietness Prevails in Pig Iron Trade—Scrap Buying is Light

ST. LOUIS, Dec. 14.—Seasonal dullness prevails in the pig iron market. Users are anxious to curtail stocks against inventory taking, and many are well covered into next year. Actual sales reported totaled 3000 tons, the largest single tonnage being 1000 tons sold by the St. Louis Coke & Iron Co. to a local wheel manufacturer. This same interest sold 800 tons to a specialty maker, and 300 to an East Side stove interest. The rest was in small lots, and the entire tonnage, with exception of about 500 tons, was for first-quarter delivery. Shipments on contracts continue in fair volume, the season considered, but inquiry is lacking. Some melters intimate that they may be in the market for substantial tonnages shortly after Jan. 1. Prices are quotably unchanged, though the tone of the market is easier than heretofore. The leading local producer continues to quote \$21 to \$21.50, f.o.b. Granite City.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago, \$4.42 from Birmingham, all rail, and 81c. average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25...	\$22.16
Northern malleable, sil. 1.75 to 2.25	22.16
Basic	22.16
Southern fdy., sil. 1.75 to 2.25...	24.42
Granite City iron, sil. 1.75 to 2.25	\$22.31 to \$22.81

Finished Iron and Steel.—The W. R. Compton Co., which is financing the toll bridge over the Mississippi River at Cape Girardeau, Mo., announces that the low bidder on the steel work for the span, involving about 4300 tons, was the American Bridge Co. The contract for the foundations, involving 300 tons of reinforcing concrete bars, has not been definitely let, the low bidders being the Union Bridge Co. of Kansas City and the U. G. I. Co. of Philadelphia. The total cost of the bridge is estimated at \$1,600,000. Warehouse business has subsided to small proportions, and the demand for building materials is at the lowest ebb in more than ten months. Sheets are quiet, both as to new business and specifications, but prices remain quotably unchanged. Some improvement in demand for supplies from the coal mines is noted, but the movement of oil country goods has fallen off. Needs of the general manufacturing trade continue fair.

Coke.—Demand is considerably less urgent than heretofore. While foundry and furnace grades are moving in fair volume, demand for domestic sizes is considerably less brisk since the coal situation has eased under influence of settlement of the strike of British miners. By-product ovens continue to operate at capacity, and have caught up somewhat on deliveries. Prices remain unchanged on all grades.

Old Material.—Industries are buying from hand to mouth and the aggregate of their purchases is not impressive. The steel specialties showed a firmer tone, due to a gesture of one leading steel maker to acquire tonnage. Cast and rolling mill grades are stagnant. Railroad offerings continue of large size, the latest including the following lists: Chicago & Eastern Illinois, 550 tons; Pullman Co., 200 tons; Nickel Plate, 240 tons; Southern, 5800 tons of scrap and 7800 tons

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes	3.25c.
Bars, mild steel or iron	3.15c.
Cold-finished rounds, shafting and screw stock	3.75c.
No. 24 black sheets	4.45c.
No. 10 blue annealed sheets	3.60c.
No. 24 galvanized sheets	5.25c.
Black corrugated sheets	4.65c.
Galvanized corrugated sheets	5.30c.
Structural rivets	3.65c.
Boiler rivets	3.85c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller	.70
Machine bolts	.50 and 5
Carriage bolts	.47 1/2
Lag screws	.55 and 5
Hot-pressed nuts, square, blank or tapped,	3.25c. off per lb.
Hot-pressed nuts, hexagons, blank or tapped,	3.75c. off per lb.

of relaying rails; Baltimore & Ohio, 25,100 tons; Great Northern, 3500 tons; Texas & Pacific, 1550 tons; Ann Arbor, 300 tons; Wabash, 3950 tons; Santa Fe, 5100 tons; Louisville & Nashville, 7100 tons; Missouri-Kansas-Texas, 2100 tons; Chesapeake & Ohio, 9900 tons, and Rock Island, 5500 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	\$10.00 to \$10.50
Rails for rolling	15.25 to 15.75
Steel rails less than 3 ft.	16.00 to 16.50
Relaying rails, 60 lb. and under ..	20.50 to 23.50
Relaying rails, 70 lb. and over ..	26.50 to 29.00
Cast iron car wheels	14.00 to 14.50
Heavy melting steel	13.00 to 13.50
Heavy shoveling steel	13.00 to 13.50
Frogs, switches and guards cut apart	14.00 to 14.50
Railroad springs	15.50 to 16.00
Heavy axle and tire turnings ..	10.50 to 11.00
No. 1 locomotive tires	16.25 to 16.75
Per Net Ton	
Steel angle bars	12.25 to 12.75
Steel car axles	17.00 to 17.50
Iron car axles	20.00 to 20.50
Wrought iron bars and transoms ..	17.50 to 18.00
No. 1 railroad wrought	10.75 to 11.25
No. 2 railroad wrought	11.75 to 12.25
Cast iron borings	9.00 to 9.50
No. 1 busheling	10.25 to 10.75
No. 1 railroad cast	14.25 to 14.75
No. 1 machinery cast	16.75 to 17.25
Railroad malleable	12.50 to 13.00
Machine shop turnings	6.25 to 6.75
Bundled sheets	7.50 to 8.00

San Francisco

Foreign Bidders Take 1279 Tons of Cast Iron Pipe in Los Angeles

SAN FRANCISCO, Dec. 10 (*By Air Mail*).—In a week notable for its lack of outstanding features, the placing of 1892 tons of cast iron pipe by the city of Los Angeles attracted attention, primarily because 1279 tons of this letting was taken by representatives of foreign producers—696 tons by a local agent of a French manufacturer, and 583 tons by a local distributor of a Belgian company.

The approach of the Christmas holidays and the preparations being made for inventory taking probably account for the present lull in steel buying. During the week there has been no important letting either in fabricated steel or in reinforcing bars. With one exception—out-of-stock quotations on reinforcing bars—prices are firm on all major steel products.

Pig Iron.—A local importer has a shipment of about 1000 tons of Indian foundry iron en route, half of which will be unloaded at Los Angeles. Specifications for first quarter have been slow to develop, and no inquiries of importance are pending. Quotations are unchanged.

Per Gross Ton	
*Utah basic	\$25.00 to \$26.00
*Utah foundry, sil. 2.75 to 3.25 ..	25.00 to 26.00
**Indian foundry, sil. 2.75 to 3.25 ..	25.00
**German foundry, sil. 2.75 to 3.25 ..	24.25

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Shapes.—While local fabricators for the most part are busy, and while the number of individual jobs calling for less than 100 tons of steel is fairly large, no lettings of importance have been made during the week. Fresh inquiry is small, both in the number of projects and in the tonnage called for. Two apartment buildings in San Francisco are expected to come out for bids

within the next ten days. Each will require about 200 tons. Bids will be opened Dec. 20 in Oakland, Cal., on 100 tons for a war memorial for Alameda county. Eastern mills continue to quote plain material at 2.35c., c.i.f. Coast ports.

Plates.—Several moderate sized tonnages are pending, but no project of 100 tons or over has been reported closed during the week. The East Bay Water Co., Oakland, Cal., is taking bids on about 900 tons for a pipe line. Fresh bids have been called for Dec. 21 on 1800 tons for nine 45,000-bbl. tanks for the Shell Oil Co., San Francisco. Eastern mills quote plates at 2.30c., c.i.f. Coast ports.

Bars.—Local reinforcing bar jobbers have taken several small sized jobs during the week, but no letting of importance is known to have been made. Prices are soft. The minimum quotations of local jobbers on concrete bars range from 2.30c. to 2.45c. per lb., on lots of 200 tons. Foreign bars are quotable on the same basis at about 2.20c.

Cast Iron Pipe.—The city of Los Angeles awarded 1892 tons as follows: 696 tons of 12 and 16-in. Class C cast iron pipe, to B. Nicoll & Co., which will furnish French pipe; 583 tons of 24-in. Class B cast iron pipe to the Grinnell Co. of the Pacific, which will supply Belgian pipe, and 613 tons of 24-in. Class B cast iron pipe to the American Cast Iron Pipe Co. The National Cast Iron Pipe Co. is low bidder on 1975 tons of sand cast iron pipe required by Sacramento, Cal. A referendum on a bond issue for water improvements requiring about 1200 tons of cast iron pipe will be held Dec. 14 at Monterey Park, Cal. Bids will be taken Dec. 16 by Glendale, Cal., on 1118 tons of 8, 12, 16, and 20-in. Class B and 12-in. Class D cast iron pipe. Spokane will take bids Dec. 16 on 542 tons of 6 and 12-in. Class B pipe. Redwood City, Cal., is expected to come into the market in the near future for 86,000 ft. of 8-in. steel or cast iron water pipe. Quotations are unchanged at \$49 to \$50 base, f.o.b. dock, San Francisco.

Warehouse Business.—No buying of importance is being done. The approach of the holidays and the preparations for the taking of inventories restrict business. Quotations are unchanged.

Rails.—Seattle, Wash., has placed 475 tons of 60 to 80-lb. standard rails with the United States Steel Products Co. No award has been made on the 1800 to 1900 tons of 70 to 80-lb. standard-section rails for the Los Angeles County Flood Control District, on which bids were closed Nov. 22. The Bethlehem Steel Co. is low bidder on new rails, and the United Commercial Co., San Francisco, is low bidder on used rails.

Coke.—A local importer has a shipment from Germany en route, but no quotations on by-product fuel for future deliveries are being made. Buyers are fairly well covered on their requirements for some time to come. No recent sales have been made, and consequently the situation in regard to prices is somewhat uncertain.

Youngstown

Waiting for New Year—Scrap Lower

YOUNGSTOWN, Dec. 14.—In this area, the iron and steel industry is awaiting the new year. In their efforts to reduce stocks to a minimum for year-end inventory, consumers are restricting orders and releases against contracts to bare requirements. Irregularity in production schedules is a natural development and the average this week for the Mahoning Valley is not above 65 per cent. Producers report that new business is developing in a satisfactory way for first quarter delivery. President John T. Harrington of the Trumbull Steel Co., for example, states that fresh orders have been received within the past ten days for sheets and strip steel which will enable the company to maintain a good average production rate during January and February. Heretofore, Trumbull has been operating in December at 85 per cent. It recently booked some im-

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes	3.30c.
Mild steel bars and small angles	3.30c.
Small channels and tees, ¼-in. to 2¼-in.	3.90c.
Spring steel, ¼-in. and thicker	5.00c.
No. 24 black sheets	4.90c.
No. 28 black sheets	5.15c.
No. 10 blue annealed sheets	4.00c.
No. 24 galvanized sheets	5.65c.
No. 28 galvanized sheets	6.15c.
Common wire nails, base per keg	\$3.75
Cement coated nails, 100-lb. keg	3.75
Cement coated nails, count kegs	3.00

portant tonnages from automobile makers in Detroit, for first quarter delivery, however.

Scrap metals have declined and heavy melting is offered by dealers at \$15.50, the lowest price in many months in the Youngstown district. Mill and furnace interests, however, have ample stocks and are doing little current buying. The principal independent interest has closed on scrap requirements for the first half, dividing the business as usual among a number of different sellers.

Independents have curtailed active merchant bar capacity to a 40 per cent level, with the Carnegie Steel Co. operating bar mills at 65 per cent. Open-hearth furnace schedules show one more unit active than the preceding week, or a total of 28, out of 53; of 127 Valley sheet mills, 87 are under power, or 10 less than the week preceding; of 18 tube mills, 12 are in operation.

The A. M. Byers Co., Pittsburgh, is operating its Girard, Ohio, works in full, except that the plate mill is on a two-turn basis four days a week.

Seattle

Wire Prices Unsettled—Warehouse Reductions in Tees

SEATTLE, Dec. 10 (*By Air Mail*).—Steel consumers are buying only for current needs, and no increase in demand is looked for until after the first of the year. Jobbers state that November tonnage showed a falling off as compared with October, but say that so far this month orders were better than in the first ten days last month. Prices are holding firm, due in part, it is held, to the fact that not enough new business is coming out to test the market. New building in Seattle continues at a high level, with good promise for steel demand early next year.

Pig Iron.—Local foundries are doing little and are not buying for next year. Only a few small lots for quick shipment have been bought. We continue to quote Utah basic and foundry at \$25 to \$26, delivered, Seattle.

Plates.—It is now stated that bids for the Yakima water lines, requiring about 3000 tons of plates, are to be opened on Dec. 13. The Longview Fibre Co. is asking prices on 200 tons for extensions to its plant at Longview, Wash. We quote tank quality plates, 1/4-in. and heavier, at 2.30c., delivered, Seattle.

Structural Material.—Several large jobs have been held up for revision of plans. These include the Blue Lakes bridge over the Snake River in Idaho, 3000 tons, and the local Paramount Theater, 1100 tons. The Puget Sound Bridge & Dredging Co. has a contract for a bridge at Brownsville, Tex., 400 tons, taken by an Eastern mill, while the Michigan-California Lumber Co. is to buy 1300 tons for a steel building, bids to be opened in a few days. Beams and channels are quoted at 2.35c., Seattle.

Bars.—The local mill has taken about 300 tons for a new theater and other jobs aggregating 400 to 500 tons. Prices on concrete bars are 2.30c. to 2.35c., Seattle delivery. Considerable foreign concrete bars have been coming into this market lately.

Sheets.—Little buying has been done by local users for first quarter, but prices quoted are on the basis of the recently announced prices of the leading interest for first quarter shipment. Those for Seattle delivery, c.i.f., are as follows: Nos. 8 and 10, blue annealed, 2.83c.; No. 24 black, 3.53c., and No. 24 galvanized, 4.38c. per lb.

Wire Products.—Prices are unsettled owing to severe competition between the California maker and an Eastern mill. Wire nails are being sold in carload lots at \$3.20, base, per keg, delivered to buyer, while small lots are being sold as low as \$3.30, and also by several mills from their local warehouses.

Warehouse Business.—November showed a decline as compared with October. A local jobber is just issuing new base prices, showing a reduction of \$5 per ton on bar sizes of tees and \$2 per ton on structural tees.

Cincinnati

Foundry Melt Declines—Pig Iron and Steel Markets Are Inactive

CINCINNATI, Dec. 14.—Although pig iron buying has been practically at a standstill, purchases in the past week having totaled less than 2000 tons, several inquiries now before the trade are expected to have an important bearing upon the trend of prices for first quarter. The Standard Sanitary Mfg. Co., Pittsburgh, is asking for quotations on 6000 tons of Northern and Southern foundry iron for delivery to its Louisville plant. Some observers believe that this transaction may bring out concessions of 50c. a ton in southern Ohio foundry iron, which now stands at \$20, base Iron-ton. Foundries in this territory recently have reduced their melt, and in some cases considerable iron contracted for during this quarter will be carried over into January and February. It is estimated that only about 25 per cent of the consumers in this district have covered their requirements for the first three months of 1927. A small quantity of Southern iron is being shipped north of the Ohio River at \$20, base Birmingham. Jackson County silvery iron is firm at \$28.50, base furnace, for 8 per cent, with first quarter orders calling for a premium of \$1 a ton. The Louisville & Nashville is inquiring for about 700 tons of foundry and charcoal iron, while the Anchor Stove Co., New Albany, Ind., will purchase 500 tons of foundry iron.

Based on freight rates of \$3.69 from Birmingham and \$1.89 from Iron-ton, we quote f.o.b. Cincinnati:

Alabama fdy., sil. 1.75 to 2.25 (base)	\$23.69
Alabama fdy., sil. 2.25 to 2.75	24.19
Tennessee fdy., sil. 1.75 to 2.25	23.69
Southern Ohio silvery, 8 per cent	30.39
So. Ohio fdy., sil. 1.75 to 2.25	\$21.89 to 22.39
So. Ohio malleable	21.39

Reinforcing Bars.—With no awards of consequence and with no new important jobs having appeared in the past week, the market is quiet. Little improvement is anticipated until after the holidays. New billet bars nominally are quoted at 2c., base Pittsburgh, and rail steel bars at 1.90c., base mill.

Warehouse Business.—A further recession in sales has taken place in the past week. Despite this decline, however, bookings are regarded as satisfactory for this late in the year, and are considerably heavier than in the same period in 1925. Prices are firm and unchanged.

Finished Material.—Specifications in the past week have tapered somewhat, but the volume of business is about normal for mid-December. Consumers, interested in keeping their inventories at the lowest point, are still postponing first quarter buying. Fresh bookings are confined almost exclusively to small orders calling for rush shipment to cover immediate needs. The jobbing trade is contracting for only a limited tonnage to be delivered early in 1927. Some producers expect a fair-sized volume of specifications during the last week of the month, but others are of the opinion that consider-

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes	3.40c.
Bars, mild steel or iron	3.30c.
Reinforcing bars	3.30c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Open-hearth spring steel	4.75c. to 5.00c.
No. 24 black sheets	4.05c.
No. 10 blue annealed sheets	3.60c.
No. 24 galvanized sheets	4.90c.
Structural rivets	3.75c.
Small rivets	.65 per cent off list
No. 9 annealed wire, per 100 lb.	\$3.00
Common wire nails, base per keg	2.95
Cement coated nails, base per 100-lb. keg	3.15
Chain, per 100 lb.	7.55
Net per 100 Ft.	
Lap welded steel boiler tubes, 2-in.	\$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.	19.00
4-in.	39.00

able material originally intended for fourth quarter delivery will be carried over into January and February. Fabricators in this territory have sufficient work in process to keep them engaged for a few weeks. They are purchasing steel in small lots and are holding strictly to a policy of keeping stocks down to a minimum. Meanwhile, prices in most commodities are firm. Both bars and structural shapes are bringing 2c., base Pittsburgh, while tank plates are unchanged at 1.90c., base Pittsburgh. Signs of the usual seasonal dullness at this time of the year are apparent in the sheet market. Black and galvanized sheets are quoted at 3c. and 3.85c., base Pittsburgh, respectively, although a few mills will not take less than \$2 a ton above those prices. Demand for blue annealed sheets is moderate in volume. Quotations range from 2.30c. to 2.40c., base Pittsburgh. Automobile body sheets are steady at 4.25c., base Pittsburgh, but sales are lagging. In the wire market both specifications and orders have been light. Common wire nails are selling at \$2.65 per keg, Ironton or Pittsburgh, and plain wire at \$2.50 per 100 lb., Ironton or Pittsburgh. Nail mills in this district are reported to be operating only about 50 per cent of capacity.

Coke.—There has been a marked decline this month in specifications for by-product foundry coke. The decrease is attributed partly to the usual seasonal dullness incident to the holidays and partly to the fact that consumers have considerable stock on hand. The abnormally warm weather prevailing in this district has adversely affected the demand for by-product domestic coke, although prices have not changed. Little beehive foundry coke has been sold in the past week. Prices still remain at high levels, the announcement of new schedules being held up until negotiations for readjustment of miners' wages are completed.

Based on freight rates of \$2.14 from Ashland, Ky., and \$2.59 from Wise County ovens and New River ovens, we quote f.o.b. Cincinnati: Wise County foundry, \$8.09 to \$9.59; New River foundry, \$11.59; by-product foundry, \$10.14.

Old Material.—The situation is unchanged. Mills are accepting limited tonnages on contract, but are postponing fresh purchases until the inventory period is over. Railroads are reported to have obtained fairly good prices for the material offered last week, especially in view of the present condition of the market. The Louisville & Nashville has a list, totaling approximately 8000 tons, closing today. Quotations are the same as a week ago.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

Per Gross Ton	
Heavy melting steel	\$12.50 to \$13.00
Scrap rails for melting	12.50 to 13.00
Short rails	17.50 to 18.00
Relaying rails	26.50 to 27.00
Rails for rolling	14.00 to 14.50
Old carwheels	12.00 to 12.50
No. 1 locomotive tires	16.50 to 17.00
Railroad malleable	14.50 to 15.00
Agricultural malleable	13.50 to 14.00
Loose sheet clippings	7.00 to 7.50
Champion bundled sheets	8.50 to 9.00
Per Net Ton	
Cast iron borings	7.50 to 8.00
Machine shop turnings	7.00 to 7.50
No. 1 machinery cast	17.00 to 18.00
No. 1 railroad cast	14.00 to 14.50
Iron axles	19.50 to 20.00
No. 1 railroad wrought	9.00 to 9.50
Pipes and flues	7.50 to 8.00
No. 1 busheling	9.00 to 9.50
Mixed busheling	5.50 to 6.00
Burnt cast	6.50 to 7.00
Stove plate	9.00 to 9.50
Brake shoes	9.50 to 10.00

Five million tons of anthracite have been displaced by the use of oil for domestic purposes, according to an estimate of E. W. Parker, Philadelphia, director of the Anthracite Bureau of Information, made at the American Mining Congress at Washington. He did not look upon it as a permanent menace to the industry because as many oil burning equipments are being taken out each year as new ones are being installed.

The abrupt slackening in the retail movement starting in late October has caused an accumulation of automobiles at retail outlets considerably in excess of this season last year, according to *Automotive Industries*. This accumulation will be reduced in the coming month through manufacturers holding back shipments.

Boston

Pig Iron Consumption and Sales Fall Off —Less Foundry Coke Moving

BOSTON, Dec. 14.—Because manufacturers using castings are taking fewer in an effort to work down inventories prior to Dec. 31, New England foundries collectively are consuming less pig iron, and that fact is clearly reflected in reported sales the past week. Not only have sales dropped off, but foundries in numerous instances are holding up shipments of iron previously bought. The H. B. Smith Co., Westfield, Mass., is one of the few New England foundries running full. It is melting about 3400 tons per month. Sales the past week were about equally divided between spot and 1927 shipments of irons ranging in silicon from 2.25 to 2.75 up to higher than 3.25 per cent, and in the aggregate were something less than 3000 tons. The Mystic Iron Works, Everett, Mass., took practically all of the spot business at prices ranging from \$21 a ton base, at stack, to better than \$22. The inability of foundries to secure prompt deliveries on iron previously bought, owing to snow, has been advantageous to the Everett furnace. Prices on Buffalo iron continue soft in spots. Owing to the lack of buying, however, it is difficult to ascertain the real status of prices.

We quote delivered prices per gross ton to most New England points as follows, having added \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia, and \$6.91 to \$7.77 from Alabama:

East. Penn., sil. 1.75 to 2.25	\$25.65 to \$26.15
East. Penn., sil. 2.25 to 2.75	26.15 to 26.65
Buffalo, sil. 1.75 to 2.25	22.91 to 23.91
Buffalo, sil. 2.25 to 2.75	23.41 to 24.41
Virginia, sil. 1.75 to 2.25	28.42 to 29.92
Virginia, sil. 2.25 to 2.75	28.92 to 30.42
Alabama, sil. 1.75 to 2.25	26.91 to 28.77
Alabama, sil. 2.25 to 2.75	27.41 to 29.27

Finished Material.—Boston will open bids Dec. 15 on 730 tons of ordinary open-hearth and on 1383 tons of open-hearth, ferrotitanium steel rails; and on Dec. 21, on rail clips and screw spikes, track and machine bolts and nut locks, on 190 tons of beams, angles and channels and on 545,000 lb. of malleable iron castings. Current activity in reinforcing bars is confined to small lots. Several thousand tons that have been hanging over the market for several weeks probably will not be closed until 1927. Mill representatives again report that first quarter business in standard shapes, plates and bars is coming in slowly. Prices on these materials are firm and unchanged.

Cast Iron Pipe.—Pawtucket, R. I., is in the market for approximately 600 tons of 6 to 24-in. pipe. No other municipalities are asking open bids on 1927 pipe, but several are sounding out the market privately. Some of the large New England gas companies also are dickering on large tonnages of pipe. Prices quoted openly on domestic pipe are: 4-in., \$59.10 a ton, delivered common Boston freight rate points; 6 to 12-in., \$54.10 to \$55.10; larger pipe, \$53.10 to \$54.10. A \$5 differential is asked on Class A and gas pipe.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Soft steel bars and small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats	7.10c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Plates	3.365c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons	4.05c.
Squares and flats	4.55c.
Toe calk steel	6.00c.

Coke.—Requisitions by New England foundries for by-product foundry coke are not so heavy as they were last month, partly because of previous stocking and partly because of the recent advance of 50c. a ton to \$13.50, delivered, within a \$3.10 freight rate zone. Indications are that December shipments will be well under those for November, this year, and December, last year. Both the New England Coal & Coke Co. and the Providence Gas Co. are freely making deliveries of domestic fuel, however, on which there is a greater profit than on foundry coke. The Providence ovens have had under consideration the discontinuance of foundry coke production but have taken no definite action. New breaking equipment is being installed by the ovens. Spot and contract, 72-hr. Connellsville foundry coke is offered in this market at \$6 a ton on cars, ovens, or about \$2 a ton less, delivered, than the price on New England fuel.

Old Material.—A further curtailment in the movement of old material out of New England is noted. Less material was purchased by brokers in the past week than in any similar period in months. A lack of mill buying, coupled with snowed-in scrap piles and spur tracks, accounts for the inactivity. Heavy melting steel continues to hold the lead in activity, with scattering purchases at \$11 a ton, on cars shipping point, but with a majority at \$10.50, or a shade more. Some dealers estimate available supplies of this material as being 50 per cent smaller than a year ago. Current business in turnings and borings is confined to scattered car lots. Such materials as forged scrap and bundled skeleton appear to have something of an edge on turnings and borings in demand. Supplies, however, are dwindling, owing to the seasonable slowing up of plants producing forged scrap and skeleton, and that serves to hold prices on a firm basis. New England foundries have been sounding out the market on machinery cast, owing to poor trucking conditions, but no actual sales are reported by Boston brokers.

The following prices are for gross-ton lots, delivered at consuming points:

Textile cast	\$18.00 to \$19.00
No. 1 machinery cast	18.00 to 18.50
No. 2 machinery cast	16.50 to 17.00
Stove plate	13.00 to 13.50
Railroad malleable	19.00 to 19.50

The following prices are offered per gross-ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$10.50 to \$11.00
No. 1 railroad wrought	11.50 to 12.00
No. 1 yard wrought	10.50 to 11.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	9.00 to 9.50
Machine shop turnings	8.00 to 8.50
Cast iron borings, chemical	10.00 to 10.50
Cast iron borings, rolling mill	8.00 to 8.50
Blast furnace borings and turnings	8.00 to 8.50
Forge scrap	8.50 to 9.00
Bundled skeleton, long	8.00 to 8.50
Forged flashings	8.50 to 9.00
Shafting	15.50 to 16.00
Street car axles	15.50 to 16.00
Rails for re-rolling	11.50 to 12.50
Scrap rails	10.50 to 11.00

Buffalo

City Buys 3500 Tons of Sheet Piling—Pig Iron Demand Drags

BUFFALO, Dec. 14.—New business in pig iron is scarce, but makers are encouraged by the prompt specifications being received and the absence of requests to hold up shipments. No sizable inquiries are before the market, and makers are adhering rigidly to quoted prices on the small lots that are figuring in current sales. They are quoting \$20, base furnace, in this dis-

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes	3.40c.
Mild steel bars	3.30c.
Cold-finished shapes	4.45c.
Rounds	3.95c.
No. 24 black sheets	4.30c.
No. 10 blue annealed sheets	3.80c.
No. 24 galvanized sheets	5.15c.
Common wire nails, base per keg	\$3.90
Black wire, base per 100 lb.	3.90

trict for foundry and malleable, and \$19 in Eastern territories on the same grades. It is probable that a large tonnage in the East would attract prices of lower than \$19 from at least two Buffalo furnaces, but it is equally true that the majority of the tonnage that is being placed now is on the \$20 and \$19 basis. Including the Charlotte furnace, 15 stacks are in blast in this district.

We quote prices per gross ton, f.o.b. Buffalo, as follows:

No. 2 plain fdy., sil. 1.75 to 2.25 ..	\$19.00 to \$20.00
No. 2X foundry, sil. 2.25 to 2.75 ..	19.50 to 20.50
No. 1X foundry, sil. 2.75 to 3.25 ..	20.50 to 21.50
Malleable, sil. up to 2.25	20.00
Basic	19.00
Lake Superior charcoal	27.28

Finished Iron and Steel.—There continues to be a recession in inquiries and orders, with some further curtailment of operation. This condition is attributed partly to the usual seasonal dullness, for basically conditions are favorable to good business. Mills and jobbers have no large inventories. The rate of buying has fallen off about 20 per cent, though prices are holding. Bars are firm at 2.265c., Buffalo, for the larger purchases, and 2.365c. for the smaller orders. The city of Buffalo has made an award of 3500 tons of sheet-steel piling for harbor improvements to the Bethlehem Steel Corporation. Business in sheets is fair, and substantial placements of rails, tie plates, etc., by the railroads have helped maintain current prices of rolled products.

Old Material.—The last measure of this market was the sale of railroad lists here at prices somewhat lower than the prevailing market. A better feeling is apparent, and while mills are still holding up orders, releases are expected, as the mills get into a position for heavier operations. There is scarcely any movement in the various grades, with the exception of stove plate, which continues to be eagerly sought.

We quote prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$14.50 to \$15.00
Selected No. 1 heavy melting steel ..	16.00 to 16.50
Low phosphorus	18.00 to 19.00
No. 1 railroad wrought	14.00 to 14.50
Carwheels	16.00 to 16.50
Machine shop turnings	9.00 to 9.50
Mixed borings and turnings	12.00 to 12.50
Cast iron borings	12.00 to 12.50
No. 1 busheling	15.00 to 15.50
Stove plate	14.50 to 14.75
Grate bars	12.00 to 13.00
Hand bundled sheets	10.50 to 11.50
Hydraulic compressed sheets	15.00 to 15.50
No. 1 machinery cast	16.00 to 16.25
Railroad malleable	16.50 to 17.00
Iron axles	24.00 to 25.00
Steel axles	16.00 to 16.50
Drop forge flashings	13.00 to 13.50

Marking Time in Canadian Scrap Market

TORONTO, ONT., Dec. 13.—Local iron and steel scrap dealers report a stagnant market. Current sales are confined to small tonnages for the immediate needs of consumers, but this is a seasonable occurrence, and dealers look for a more active demand after the turn of the year. In most cases consumers are unwilling to enter the market, because they have enough scrap on hand to carry them through the remainder of the year. Under their policy of keeping down prices, the majority are holding back as long as possible before placing contracts. It is understood, however, that many have only sufficient scrap on hand to carry them through this year, after which it is likely to be the dealer's innings. Dealers' buying prices are firm as follows:

	Toronto	Montreal
Per Gross Ton		
Steel turnings	\$8.50	\$8.00
Machine shop turnings	8.50	7.00
Wrought pipe	6.00	6.00
Rails	11.00	10.00
No. 1 wrought scrap	11.00	14.00
Heavy melting steel	11.00	9.00
Steel axles	16.00	17.00
Axles, wrought iron	18.00	19.00
Boiler plate	10.00	8.00
Heavy axle turnings	9.00	8.50
Cast borings	8.50	7.50
Per Net Ton		
Standard carwheels	15.00	16.00
Malleable scrap	14.00	14.00
Stove plate	10.00	13.00
No. 1 machinery cast	16.00	18.00

FABRICATED STRUCTURAL STEEL

Awards Total 63,560 Tons—New Projects Below Average of Recent Weeks

Awards of fabricated structural steel during the last week totaled 63,560 tons, an aggregate that has been exceeded but once during the year. Railroads were prominent in the week's buying, 11,500 tons having been taken for subway construction in New York and 9400 tons by the Chesapeake & Hocking Valley Railroad for new construction in Ohio. New projects up for bids totaled 21,850 tons, of which 9000 tons will be required for an office and loft building in New York. Awards follow:

PROVIDENCE, R. I., 400 tons, athletic building for Brown University, to an unnamed fabricator.

PROVIDENCE, 6000 tons, Industrial Trust Co. building, to McClintic-Marshall Co.

SPRINGFIELD, MASS., 800 tons, theater, to Palmer Steel Co.

NEW YORK, 6500 tons in the following awards as reported to the Structural Steel Board of Trade: Nine-story apartment building, 30 West Ninetieth Street, to Paterson Bridge Co.; foundation truss, Catharine Slip, biology building, Fordham University, addition Bronx Hospital, Fulton Avenue and 169th Street, and apartment building, 33 East Seventy-second Street, to Hedden Iron Construction Co.; 22-story loft building, Eighth Avenue and Thirty-seventh Street, and 20-story loft building, 336 Fourth Avenue, to Taylor-Fichter Steel Construction Co.; substructure for hotel, 258 West Forty-fifth Street, and theater, Grand Avenue and 164th Street, Corona, to George A. Just Co.

NEW YORK, 6200 tons, Lincoln Hotel, Eighth Avenue and Forty-fourth Street, to Levering & Garrigues Co.

NEW YORK, 11,500 tons, section 5, route 101, Washington Heights subway, to American Bridge Co.

NEW YORK, 1300 tons, Coney Island elevated railroad connection, to McClintic-Marshall Co.

PHILADELPHIA, 1000 tons, steam station for Philadelphia Electric Co., to American Bridge Co.

CHESAPEAKE & HOCKING VALLEY RAILROAD, 9400 tons, bridges, 4800 tons to Mount Vernon Bridge Co. and 4600 tons to Bethlehem Steel Co.

CAPE GIRARDEAU, Mo., 4800 tons, Mississippi River bridge, to American Bridge Co.

PHILADELPHIA, 4000 tons, office building at Ninth and Sansome Streets for Philadelphia Electric Co., to American Bridge Co.

HANOVER, PA., 180 tons, factory building, to A. B. Rote & Co., Lancaster, Pa.

SHARON, PA., 300 tons, bridge for Erie Railroad, to American Bridge Co.

WILLIAMSPORT, MD., 900 tons, extension of power plant, to Fort Pitt Bridge Works.

NORFOLK, VA., 120 tons, switch house, Stone & Webster, Inc., to American Bridge Co.

DANVILLE, VA., 350 tons, towers for Appalachian Electric Power Co., to American Bridge Co.

DECATUR, ALA., 450 tons, mill building, to Decatur Steel & Iron Co.

SUN, TEX., 1500 tons, six 80,000-bbl. tanks, Sun Oil Co., to Warren City Tank & Boiler Co., Warren, Ohio.

SMITH BLUFFS, TEX., 250 tons, one 80,000-bbl. tank, Pure Oil Co., to Warren City Tank & Boiler Co.

PORT ARTHUR, TEX., 1500 tons, six 80,000-bbl. tanks, Gulf Refining Co., to Pittsburgh district fabricator.

CINCINNATI, 3000 tons, addition to Union Central Building, to McClintic-Marshall Co.

CINCINNATI, 100 tons, building for Goldsmith Metal Lath Co., to L. Schreiber & Sons, Cincinnati.

MARIETTA, OHIO, 110 tons, horse and props, United States Engineers, Huntington, W. Va., to American Bridge Co.

PEKIN, ILL., 200 tons, building for Corn Products Refining Co., to Vierling Steel Works.

WHITING, IND., 2200 tons, power house for Standard Oil Co., to American Bridge Co.

NORTHERN PACIFIC, 500 tons, 8 80-ft. deck girder spans, to American Bridge Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

DANVERS, MASS., 100 tons, school.

NEW YORK, 9000 tons, office and loft building at 2 Park Avenue.

BROOKLYN, 2500 tons, Jewish hospital on Prospect Place.

PATERSON, N. J., 1000 tons, Erie Railroad bridge.

TRENTON, N. J., 600 tons, theater.

PHILADELPHIA, 250 tons, theater at Levering and Ridge Avenues.

CARMEN, CAL., 1800 tons, bridge for Michigan-California Lumber Co.

CLEVELAND, 600 tons, Ford Motor Co., assembly building.

CLEVELAND, 1500 tons estimated, Standard Oil Co. of Ohio, refinery buildings, drums and tanks.

OAKLAND, CAL., 100 tons, Alameda County War Memorial; bids Dec. 20.

OAKLAND, 900 tons, pipe line for the East Bay Water Co.; bids being taken.

SAN FRANCISCO, 400 tons, apartment buildings; bids to be called soon.

SAN FRANCISCO, 1800 tons, 9 45,000-bbl. tanks for the Shell Oil Co.; bids opened Dec. 21.

LONGVIEW, WASH., 1300 tons, pulp mill for Longview Fibre Co.

RAILROAD EQUIPMENT

Norfolk & Western Orders 2000 Cars—New Inquiries Comparatively Light

Car purchases during the last week totaled slightly less than 2200 of which 2000 were taken by the Norfolk & Western. Inquiries fell off sharply, the only sizable one having been made by the Atchison, Topeka & Santa Fe for 150 sulphur-carrying cars. Items of the week follow:

The Norfolk & Western has ordered 2000 70-ton hopper bottom gondola cars, the business being divided equally between the Ralston Steel Car Co. and the Virginia Bridge & Iron Co. This railroad is also inquiring for 3 dining cars.

The Atlantic Coast Line has ordered 100 ballast cars from the Virginia Bridge & Iron Co.

The Pennsylvania Coal Co. has bought 50 mine cars from the American Car & Foundry Co.

The Kopper Industrial Car & Equipment has sold an air-dump car to the Andrews Steel Co.

The Gulf, Mobile & Northern is in the market for two passenger-baggage cars.

The Atchison, Topeka & Santa Fe is inquiring for 150 sulphur-carrying cars.

The Louisville, Henderson & St. Louis has ordered 15 40-ton stock cars from the American Car & Foundry Co.

The Boston & Maine is expected to inquire soon for 500 hopper bottom coal cars.

The New York Central has ordered 20 automatic steel dump cars from the Clark Car Co.

The Chicago, South Shore & South Bend is in the market for 10 motor cars and 10 trailers.

The Pennsylvania has awarded 60 electric cars, 30 to the Standard Steel Car Co., 15 to the Pressed Steel Car Co. and 15 to the American Car & Foundry Co.

December Scrap Production Lowest of Year

DETROIT, Dec. 14.—The old material market is very quiet, with buyers holding off until after the first of the year. With several of the largest producers closing for inventory period, the production for the month will be by far the lowest of the year and the small tonnage coming out is being taken care of on old orders.

The following prices are quoted on a gross ton basis f.o.b. producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting and shoveling steel	\$12.50 to \$13.00
Borings and short turnings	9.00 to 9.50
Long turnings	8.00 to 8.50
No. 1 machinery cast	17.00 to 18.00
Automobile cast	20.50 to 21.50
Hydraulic compressed	11.75 to 12.25
Stove plate	13.50 to 14.50
No. 1 busheling	11.00 to 11.50
Sheet clippings	7.75 to 8.25
Flashings	10.75 to 11.25

NON-FERROUS METAL MARKETS

	Dec. 14	Dec. 13	Dec. 11	Dec. 10	Dec. 9	Dec. 8
The Week's Prices						
Lake copper, New York.....	13.75	13.75	13.75	13.75	13.75	13.75
Electrolytic copper, N. Y.*..	13.37½	13.37½	13.35	13.35	13.35	13.32½
Straits tin, spot, New York..	68.62½	68.50	...	68.25	68.00	68.87½
Lead, New York.....	7.90	7.90	7.90	7.90	7.90	7.90
Lead, St. Louis.....	7.70	7.70	7.70	7.70	7.70	7.70
Zinc, New York.....	7.40	7.40	7.37½	7.37½	7.35	7.35
Zinc, St. Louis.....	7.05	7.05	7.02½	7.02½	7.00	7.00
Cents per Pound for Early Delivery						

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, Dec. 14.—Pronounced quietness prevails in the copper market after over a week of activity. Buying of tin has been fairly heavy with prices a little lower. There has been almost no change in the lead market during the week. What appears to be the bottom of the zinc market developed last week and prices are a little stiffer.

Copper.—It now develops that the total sales of copper, which started when consumers came into the market on Dec. 3 and which continued for about ten days, amounted to close to 50,000 tons, or 100,000,000 lb. A feature of this buying movement is that the price did not advance more than ¼c. per lb. and that the majority of the buying was done at 13.50c. to 13.60c., delivered in the Connecticut Valley. The quotation for electrolytic copper today is quite firm at 13.62½c., delivered. Most of the heavy sales referred to were for delivery in December, January and into February, with very little metal sold for March. The opinion is expressed that consumers still have considerable copper to buy for February and perhaps January. The official quotation of Copper Exporters, Inc., is still 13.95c., c.i.f. Hamburg. A very good business for export is reported. Lake copper is quoted at 13.75c., delivered.

Tin.—The week has been quite an active one, with heavy sales made on one day; Thursday, Dec. 9, was exceedingly active, with the turnover estimated at over 1000 tons. Most of the selling was done by three large

dealers and consumers were the chief buyers. In the selling there were some signs of liquidation and of switching to the short side of the market, because all the sales made here were not covered the next day in the two principal foreign markets. On Dec. 7 about 200 tons was sold with 50 tons sold on Dec. 8 bringing the total for the calendar week to about 1700 tons. Yesterday about 100 tons changed hands, principally among dealers. Today the market has been only moderately active, with Straits tin quoted at 68.62½c., New York. Business was done for spot, December and January delivery. In London prices today were a little lower than a week ago, with spot standard quoted at £308 5s., future standard at £299 10s. and spot Straits at £315 15s. The Singapore market today was £307 5s. Arrivals thus far this month have been 2800 tons, with 6080 tons reported afloat.

Lead.—The market is very quiet and featureless with demand only moderate. The contract price of the leading producer continues unchanged at 7.90c., New York, and quotations in the outside market are 7.70c., St. Louis.

Zinc.—Quotations for prime Western zinc gave way further during the week until 7c., St. Louis, was reached. This is regarded by many as the bottom of the market, although there were a few sales at 6.97½c. In the last two or three days the market has stiffened a little until today it is fairly firm at 7.05c., St. Louis, or 7.40c., New York. Buying has tapered off quite decidedly, although there has been some good business done. There have been quite a number of requests from consumers for postponement of December metal to January delivery, particularly among galvanizers.

Antimony.—The market is considerably easier and Chinese metal is quoted at 13c., New York, duty paid, for prompt, with futures held at 12.75c.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c., with shot nickel at 36c. and electrolytic nickel at 39c. per lb.

Metals from New York Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	70.00c. to 71.00c.
Tin, bar.....	72.00c. to 73.00c.
Copper, Lake.....	14.50c.
Copper, electrolytic.....	14.25c.
Copper, casting.....	13.75c.
Zinc, slab.....	7.75c. to 8.25c.
Lead, American pig.....	8.50c. to 9.00c.
Lead, bar.....	11.00c. to 12.00c.
Antimony, Asiatic.....	14.50c. to 15.50c.
Aluminum, No. 1 ingot for remelting (guaranteed over 99 per cent pure).....	29.00c. to 30.00c.
Babbitt metal, commercial grade.....	30.00c. to 40.00c.
Solder, ½ and ½.....	44.00c. to 45.00c.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	74.25c.
Tin, bar.....	76.25c.
Copper, Lake.....	14.75c.
Copper, electrolytic.....	14.75c.
Copper, casting.....	14.25c.
Zinc, slab.....	8.50c.
Lead, American pig.....	8.75c.
Antimony, Asiatic.....	17.50c.
Lead, bar.....	10.75c.
Babbitt metal, medium grade.....	21.75c.
Babbitt metal, high grade.....	28.25c.
Solder, ½ and ½.....	43.75c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

Sheets—	
High brass.....	18.87½c. to 19.87½c.
Copper, hot rolled.....	22.50c. to 23.50c.
Copper, cold rolled, 14 oz. and heavier.....	24.75c. to 25.75c.
Seamless Tubes—	
Brass.....	23.75c. to 24.75c.
Copper.....	24.50c. to 25.50c.
Brazed Brass Tubes.....	26.87½c. to 27.87½c.
Brass Rods.....	16.62½c. to 17.62½c.

From New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	12.75c. to 13.00c.
Zinc sheets, open.....	13.25c. to 13.50c.

Non-Ferrous Rolled Products

Mill prices on bronze, brass and copper products and on lead full sheets have not changed since Nov. 25 and Nov. 4 respectively. Zinc sheets were reduced ¼c. to 11.50c. on Dec. 8 after having been quoted at 11.75c. since July 20.

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—

High brass.....	18.62½c.
Copper, hot rolled.....	22.25c.
Zinc.....	11.50c.
Lead (full sheets).....	11.75c. to 12.00c.

Seamless Tubes—

High brass.....	23.50c.
Copper.....	24.25c.

Rods—

High brass.....	16.37½c.
Naval brass.....	19.12½c.

Wire—

Copper.....	15.62½c.
High brass.....	19.12½c.
Copper in Rolls.....	21.12½c.
Brazed Brass Tubing.....	26.62½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of the Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide....	37.50c.
Tubes, base.....	48.00c.
Machine rods.....	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	18½c.
Copper, hot rolled	22.25c.
Copper, cold rolled, 14 oz. and heavier	24.50c.
Zinc	12.25c.
Lead, wide	11.25c.
Seamless Tubes—	
Brass	23.50c.
Copper	24.25c.
Brazed Brass Tubes	26¼c.
Brass Rods	16¾c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 26.50c. to 27c. per lb., delivered.

Non-Ferrous Metals at Chicago

DEC. 14.—This market is quiet and the prices of tin and lead are lower. There is little or no demand for old metals and the price tendency is downward.

We quote, in carload lots: Lake copper, 13.85c.; tin, 70c.; lead, 7.80c.; zinc, 7.15c.; in less than carload lots, antimony, 15c. On old metals we quote copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 9.50c.; red brass, 9.25c.; yellow brass, 7.50c.; lead pipe, 6.50c.; zinc, 4.75c.; pewter, No. 1, 35c.; tin foil, 43.50c. block tin, 52c.; aluminum, 16.50c.; all being dealers' prices for less than carload lots.

New Record Possible in Year's Bituminous Production

With the exception of 1918, production of bituminous coal up into December has been the greatest ever recorded. Including Dec. 4, the current amount is reported by the Bureau of Mines at 530,232,000 net tons. In 1923, the largest recent year, the total to that date was 526,084,000 tons. In 1920, another large year, it was 521,592,000 tons.

As 1920 and 1923 averaged about 42,000,000 tons subsequent to Dec. 4, total production for 1926 on the basis of a similar performance would reach 572,000,000 tons. Inasmuch, however, as the current rate of production is breaking all records, this figure may be considerably exceeded. The largest quantity of bituminous coal ever raised in any year—that of 1918—was 579,386,000 net tons.

Weekly Record Again Broken

In the week ended Dec. 4, bituminous coal to the amount of 14,728,000 net tons was raised in United States mines. This is the largest amount for any week on record. It displaces the revised figure of the previous high week—that of Nov. 20—which was 14,282,000 tons. In spite of the Thanksgiving half-holiday, the amount mined in the week ended Nov. 27 was 13,413,000 tons—a figure which has been reached in not more than 10 weeks in our coal history.

Seamless Tube Expansion Will Mark Pittsburgh District Enlargements

A good deal of money will be spent on plant by Pittsburgh district steel companies next year. The Jones & Laughlin Steel Corporation will build a seamless tube plant at its Woodlawn, Pa., works, and the National Tube Co. is reported to have been granted the appropriation for another seamless unit at Lorain, Ohio. Weirton Steel Co., Weirton, W. Va., will take up the matter of a seamless tube mill installation after it is further along with its new wide strip mill, and the Standard Seamless Tube Co., Economy, Pa., is said to have prepared plans for an extensive addition to plant and equipment.

The next step in the program of the Carnegie Steel Co., at its Homestead, Pa., works, following the completion of the new H-beam mill, will be the rebuilding and modernization of the plate mills. Experience having demonstrated the economy of the large hearth

Old Metals, Per Pound, New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators, and the selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	11.00c.	12.75c.
Copper, heavy and wire	10.75c.	11.75c.
Copper, light and bottoms	9.00c.	10.50c.
Brass, heavy	6.75c.	8.25c.
Brass, light	6.00c.	7.50c.
Heavy machine composition	8.50c.	10.00c.
No. 1 yellow brass turnings	8.25c.	8.87½c.
No. 1 red brass or composition turnings	8.00c.	9.00c.
Lead, heavy	6.50c.	7.00c.
Lead, tea	4.75c.	5.50c.
Zinc	4.25c.	4.75c.
Sheet aluminum	16.50c.	18.50c.
Cast aluminum	16.50c.	18.50c.

furnace with its high unit production, that company in the coming year will replace several furnaces in this district with units capable of big individual yields.

Favors Buying for Three-Month Periods

PITTSBURGH, Dec. 14.—President William G. Clyde, Carnegie Steel Co., praised warmly the improved service of the railroads at a dinner of the traffic club of Pittsburgh at the William Penn Hotel here last evening. He was the honor guest and principal speaker.

Improved transportation facilities, he said, had fostered the widely adopted custom of hand-to-mouth purchasing, which in turn had permitted greater industrial economy. Reductions in demurrage bills, quicker loadings and unloadings, more ample supplies of cars, smaller inventories, fuller loading and less traffic congestion were among the benefits cited by Mr. Clyde as resulting from the increased transportation efficiency that has developed during the last six years.

The practice of hand-to-mouth buying, the speaker said, has leveled out the peaks of transportation and eliminated much of the traffic congestion prevalent in certain months under the old shipping system. But it also meant, he said, that steel mill schedules had to be changed with great frequency, and mill efficiency could be raised appreciably if the steel companies could know what was expected of them 60 to 90 days ahead of delivery instead of a week or less, as is now not unusual. There would be a happier situation for both the mills and the railroads if consumers bought steel on the basis of their requirements for three-month periods.

Try to Unionize New England Foundry

New England foundries are watching with great interest developments at the plant of the Old Colony Foundry Co., East Bridgewater, Mass. In October the foundry closed when it was found an effort was being made to unionize the workers. On Friday, Dec. 10, the company announced its intention of reopening the plant. Notice was posted that old employees would be taken back up to and including Dec. 20 at the old wage.

A force of new workers was imported from Boston and elsewhere and on Dec. 10 was marched to the foundry under police protection. At the gate of the foundry more than forty former employees attacked the newcomers and police.

Following the fighting the union obtained a warrant for the officer escorting the men to work, charging assault. At the same time the company obtained fifteen warrants charging strikers with assault. Later a temporary injunction was obtained by the company restraining former employees from picketing the foundry.

Bowring & Co., 17 Battery Place, New York, have been appointed exclusive sales agents for the Benzon Fluorspar Co., Chicago, with mines at Cave-in-Rock, Ill. G. F. Murray, in charge of the ore and metals department, will handle sales of the fluorspar.

PERSONAL

John B. Smiley, whose election to the presidency of the Remington Arms Co., Inc., New York, was announced in this column last week, entered the steel industry immediately after his graduation from college, in the operating department of the Pennsylvania Steel Co. Following some years in the sales department of this company, he established himself as a consulting engineer and contractor in western Canada. Later he organized the Smiley Steel Co., an export organization with headquarters at 115 Broadway, New York, continuing as president of this company until 1917, when he became president of the Bayless Shipyard, Port Jefferson, N. Y., which was engaged in building fabricated steel vessels for the Emergency Fleet Corporation. In 1921 he organized the Poldi Steel Corporation of America, New York, to handle in the United States the products of the Poldi Steel Corporation, a manufacturer of high-speed and tool steels, with plants at Kladno and Komotau, Czechoslovakia. Resigning from the presidency of this company in 1925, Mr. Smiley soon became associated with the Remington company, and has been acting in a special executive capacity for several months.



JOHN B. SMILEY

Wilfred S. Lowry has become associated with the American Brown Boveri Electric Corporation, New York, as an application engineer in the blower division at the company's Camden, N. J., plant. He was formerly employed at the Lynn, Mass., plant of the General Electric Co. as a specialist in centrifugal compressors, constant current transformers and small turbines. J. M. Van Niekerken, who was recently added to the Brown Boveri organization as a railroad engineer, had previously been connected with the General Electric Co., Ltd., Birmingham, England; the British Westinghouse Electric & Mfg. Co., Ltd., Manchester, England; the Westinghouse Electric & Mfg. Co., East Pittsburgh, and the Cleveland Union Terminals Co., Cleveland.

Stewart M. Bunting, sales manager of the miscellaneous department, Niles-Bement-Pond Co., New York, will be connected after Jan. 1 with the Smith, Booth, Usher Co., Los Angeles.

John A. Topping, chairman of the board Republic Iron & Steel Co., Youngstown, Ohio, has been elected a director of the Bankers Trust Co., New York.

Paul Ackerman has been appointed engineer, service department Timken Roller Bearing Co., Canton, Ohio. Service work of the automotive, industrial and steel mill divisions will be coordinated under his direction, with headquarters at Canton.

A. J. Coskey, formerly purchasing agent for the Seattle Astoria Iron Works, Seattle, Wash., has been made assistant treasurer of the company. F. H. Magune, recently traffic manager, has been made purchasing agent.

J. G. Stromp has been made general sales manager of the J. E. Moss Iron Works, Wheeling, W. Va., steel fabricators.

L. T. Kay has been appointed purchasing agent for the General Fireproofing Co., Youngstown, Ohio, succeeding C. Y. Farrell.

Charles T. Whitney has been made Philadelphia district sales manager for the Treadwell Engineering Co., Easton, Pa., with headquarters at 1011 Chestnut Street, Philadelphia.

Fred H. Lewis, recently purchasing agent for the United States Chain & Forging Co., Pittsburgh, has been made plant manager of the company's York, Pa., works. He is succeeded as purchasing agent by Roy J. Nelson.

J. H. Ridge has been appointed branch manager at Pittsburgh for the Timken Roller Bearing Service & Sales Co., Canton, Ohio. G. G. Weston has been given a similar position for the company at Omaha, Neb.

George S. Trayser, for some time connected with the sales department of J. K. Larkin & Co., 253 Broadway, New York, has been appointed manager of sales for the company.

A. W. Scarratt, who recently was appointed assistant chief engineer for the Hyatt Roller Bearing Co., Newark, N. J., had been associated for the last 14 years with the Minneapolis Steel & Machinery Co., Minneapolis, where he specialized in the development of motor trucks and buses. Prior to this he had served in both the mechanical department and the power house and electrical development division of the Twin City Rapid Transit Co., Minneapolis. He was one of the organizers of the Society of Tractor Engineers in Minneapolis, and an important factor in the merging of that organization with the Society of Automotive Engineers, at present being secretary of the Minneapolis section of that body.

O. M. Olson, field engineer for the United States Silica Co., Chicago, will become associated on Jan. 1 with the American Foundry Equipment Co., Mishawaka, Ind., as consulting field engineer and direct representative of the president. Prior to his work with the silica company, where he had become a specialist in sand blasting practice, he was identified with the *Chicago Daily News*, the *Chicago Tribune* and the Shuman Advertising Co., Chicago.

Frank D. Chase, consulting engineer and specialist in foundry problems, has been elected a vice-president of the Chicago Association of Commerce.



O. M. OLSON

T. O. Gammon, recently branch manager at Detroit for the Durand Steel Locker Co., 33 South Clark Street, Chicago, has been placed in charge of the company's branch sales office and warehouse at New York. He will be succeeded in Detroit by L. R. Pettingill, formerly assistant sales manager at Chicago.

P. L. Getzinger, recently representative in Chicago for the Kinite Co., Milwaukee, has become connected with the sales force of the Ziv Steel & Wire Co., Chicago, as special representative.

Arthur F. Blasdel has resigned as works superintendent of the General Electric Co., Pittsfield, Mass., effective Dec. 22, and will locate in San Diego, Cal. He has been associated with the company since 1911.

and will be succeeded by Carl S. Dixon, for a number of years superintendent of foundry. Mr. Dixon's successor will be Joseph A. Mendel.

Harry H. Kerr, Boston Gear Works, was elected president of the Employers' Association of Eastern Massachusetts at the annual meeting, Dec. 8 at Young's Hotel, Boston. Other officers of the organization were reelected.

N. H. Shiels has become associated with the scrap iron department of Hickman, Williams & Co., Cincinnati. He formerly was connected with the Schadel-Workum Co., Portsmouth, Ohio, scrap iron dealer.



WILLIAM I. HOWLAND, JR., whose appointment as assistant general manager of sales in charge of the bar division of the Illinois Steel Co., has been announced.



ORRIN H. BAKER, as reported in THE IRON AGE last week, has been made assistant general manager of sales in charge of the rail division of the Illinois Steel Co.

George A. Richardson, director technical publicity Bethlehem Steel Co., was the speaker at the December meeting of the Cincinnati chapter of the American Society for Steel Treating Dec. 9. A five-reel motion picture showing the practice of the Bethlehem Steel Co. in the manufacture of fine tool and alloy steels was shown.

Edwin H. Brown, formerly engineer of the steam turbine department Allis-Chalmers Mfg. Co., Milwaukee, has been appointed assistant manager of the department.

Slight Drop in Steel Works Employment

There was a drop of 0.2 per cent in employment in 216 identical iron and steel establishments from September to October, according to figures of the United States Bureau of Labor Statistics. The number of men involved decreased from 288,661 to 288,030. Meantime, however, a gain of 4.5 per cent was registered in the total amount of payroll, which for one week in September was \$8,720,041 against \$9,108,170 in October. This means a gain of 4.7 per cent in the average pay envelope.

Under the heading of foundry and machine shop products, with 998 plants represented, the number of employees declined from 256,886 to 254,457, or 0.9 per cent. Here again the payrolls increased from \$7,446,403 to \$7,631,585, or 2.5 per cent. There was a gain in employees in 156 establishments making machine tools, the number going from 31,950 to 32,597, an increase of 1.4 per cent. The payrolls in this case gained 4.7 per cent, from \$962,690 to \$1,008,180.

BETHLEHEM HONORS H. E. LEWIS

Twenty Years' Growth in Peace-Time Products at the Steel Plant

High tributes were paid to his activities as a citizen and as an industrial leader in the dinner given to H. E. Lewis, vice-president Bethlehem Steel Corporation, by the Chamber of Commerce of Bethlehem, Pa., on Monday evening, Dec. 6. Charles M. Schwab, Eugene G. Grace and President E. E. Loomis of the Lehigh Valley Railroad were among the speakers. Mr. Lewis's remarks dealt in part with civic developments in the 20 years of his residence in Bethlehem, which had a population of 27,000 in 1906 compared with about 65,000 today. In speaking of the growth of the great Bethlehem plant in the two decades Mr. Lewis made the following interesting comparisons:

"In 1906 the Bethlehem Steel Co. employed in steel making and manufacturing, as well as in its general office at Bethlehem, 6698 men and women, and our payroll, exclusive of executive officers, averaged 18c. per hour with a monthly average of \$45.50 or \$544.80 for the year for each man employed, with a total payroll for the year of \$3,649,049.

"In the interim we have had the unusual high peak war years, but we are now back to normalcy and today at Bethlehem 12,700 people are employed by us, exclusive of executive officers, at an average rate of 65.3c. per hour or \$158.31 per month, which is at the average rate of \$1,899.72 per annum for each employee. This is quite a sum, running in the neighborhood of \$22,000,000 this year.

"You know our problem of converting our war plants to commercial lines has had many perplexing sides, and the progress in this conversion has not been as rapid as we would have liked. We are now well beyond the developing stage and real progress is being made with our oil engines, motor truck wheels, auxiliary locomotives and other machinery products.

"No. 2 shop, which had been an ordnance shop for almost 40 years, is employing today 487 men engaged wholly on peace-time products, and within a year we expect to increase the force of this shop several hundred more. The same is true generally of our foundries and other machine shops. Our old armor plate forge today makes no armor plate, as the naval ships being built at the present time in this country do not require armor; but it might surprise you to know that for the present we cannot take more orders for this mammoth forge, as it is filled with commercial work for the entire year of 1927.

"When I came to Bethlehem in 1906 the construction of the mills at Saucon had just started, and when we got them running I well remember Mr. Schwab promising old 'Pop' Schultz a trip to Europe when he reached 15,000 tons in any one month. Do you know that in the month of March, this year, there were shipped from the Saucon division alone 96,271 tons to our customers? Perhaps all of you do not know it, but right here in Bethlehem we have the largest structural steel plant in the world. And this Saucon plant will ship over 1,000,000 gross tons of structural steel during the year 1926. Eighty-five per cent of the structural steel used in the skyscrapers of New York is from our Saucon plant."

Obituary

L. VICTOR FROMENT, formerly a partner in Froment & Co., New York, died Dec. 11 at his home at Warrenton, Va. He had been associated with his father and brother in the Froment company during his entire business life, but had retired about three years ago. He was 47 years of age.

Only once has every month in a calendar year shown pig iron production in excess of 100,000 tons per day. That was in 1916. Eleven months of 1926 have been above the 100,000-ton mark. If December shows an amount above that—the furnaces on Dec. 1 were operating at the rate of 105,850 tons per day—a second year of high production will have been recorded.

Business Puts Government in Business

Either Wrong Practices or Direct Requests Lead to Calls on Washington for Correction of Existing Conditions

WASHINGTON, Dec. 14.—The growing tendency toward centralization of government in Washington was laid in part at the door of business itself by Secretary of Commerce Hoover in an address on Dec. 7 before the American Mining Congress. Declaring that, so far as he knows, no one argues in favor of such centralization of government, Mr. Hoover said, in concluding his remarks:

"What I do know, and I should like to emphasize it, is that there is never any proposition that comes before Congress, connected with business or the economic world, that might amount to an extension of governmental activities, which is not supported by some fraction of the business world. Therefore the business world might consider whether it is not itself largely responsible for this growing activity."

States Dodge Responsibility

In opening his address, Secretary Hoover pointed out that it is not necessary to argue the theory of why democracy in this country is little adapted to centralization. The only big thing of interest, he asserted, is why and how it comes about that our Government becomes perceptibly more centralized from year to year. The first of causes, to his mind, is the unwillingness of the States to accept their responsibility in the American form of decentralized government. The States throw the burden upon the Federal Government, and notably so where conflicts in connection with public problems are most bitter.

"And then there is another broad question which I believe is probably the most profound cause of all expansion of government. That is the failure of our business world itself. I do not believe that you can search through the expansion of the Federal Government, in the way of regulatory action or other action of importance in connection with business and industry, without finding that the expansion was the direct result of public indignation at practices in our business world.

To Correct Practices We Now Condemn

"Consider the Sherman act and the initiation of railroad legislation. Today, as we review the practices of those times, we universally condemn them. And if it were put up to the business world today to pass upon the desirability of the Sherman act, in view of the experience both before and since the enactment of that law, and with our present broader view of competitive relations, I think you would get an overwhelming majority of the business world in support of that legislation.

"That legislation would never have come about had it not been that there was a considerable public griev-

ance. And all the agitations that I see come to Washington come up in the form of a public grievance at some line of activity that has been more or less delinquent. My own belief is that it is usually less in these days than more.

Business Asks for Regulation

"But we have the curious situation in Washington that most of the proposals for expansion of government into business, into industry and commerce, either in regulatory or other fashions, arise from the business men themselves. I cannot recall a single instance of a project that has been promoted, since I have been in Washington, except by some section of the business community.

"And what is the situation in that respect? That particular section comes to Washington with the belief that it is suffering some kind of injustice, and that something ought to be done to save it from difficulties of some sort or other. They are the folk who bring about this sort of thing. Thus we have this curious complex: That the Government seldom, if ever, enters upon an expansion in connection with industry unless there is a considerable public grievance, and the impetus for action comes from the business world. I cannot recall, in the last few years at least, any expansion of Government in business that has arisen from the so-called reformer type.

Education and Cooperation Essential

"And that brings me to this conclusion: That the business world needs a certain amount of education as to the fundamental results of this sort of factional and sectional pushing against the other; that, unless our business folk are prepared to sit down and cooperate, on the one hand, to solve the difficulties imposed upon the public, and unless business is prepared to fight out its battles within its own ranks, I see no other situation than the constant pressure in Washington for further and further expansion of Federal activities."

Mr. Hoover made it plain that he did not include in his criticism the activities of the Government that could not otherwise be carried out in the way of promoting the welfare of business and commerce generally. He urged reorganization of government departments, so that the work could be coordinated, and not duplicated and scattered so widely as at present.

In the system of best government, Mr. Hoover said, what is required is constant guardianship against radical action, and the solution of problems to prevent greater troubles that may be awaiting in connection with social and economic questions.

Improvements at Ohio Works of Carnegie Company

YOUNGSTOWN, Dec. 14.—The Carnegie Steel Co. is planning to go forward during 1927, with improvements to its open-hearth works here, which will increase productive capacity 10 to 15 per cent, or about 100,000 tons of ingots annually. No new furnaces will be installed, but the existing 15 open-hearth furnaces will be improved and enlarged. Two 1200-ton mixers will be installed, one at the open-hearth plant and the other at the Bessemer department, Ohio Works. The changes will require upward of 10 months for completion. The theoretical steel-making capacity of the Ohio Works steel plant is 1,750,000 tons of ingots per annum. According to estimates, the open-hearth plant will produce this year about 900,000 tons. The

capacity of the Bessemer plant is about 700,000 tons.

Additions to the Carnegie Company's active merchant bar capacity in this area within recent years, requiring larger tonnages of semi-finished steel, are responsible for the enlargement in steel-making capacity. Heretofore these additional steel needs of the bar mills have been met by drawing upon steel-making units of other Steel Corporation subsidiaries.

Production of anthracite in the United States in 1926, through Dec. 4, is reported by the Bureau of Mines at 78,774,000 net tons. This compares with 61,537,000 tons in the same period last year, when the strike cut off mining activity for some months. In 1924 the total production, to Dec. 31, was 87,927,000 tons.

British Blast Furnaces Resume

Many Mills Await Lower Fuel—Steel Cartel Reduces Annual Quota—United Steel Works Controls More Than Half German Output

(By Cable)

LONDON, ENGLAND, Dec. 13.

FUEL prices are declining but are still generally above the price ideas of consumers. More blast furnaces connected with steel works have been blown in, but the independent furnaces are waiting for cheaper fuel.

But little iron in the open market is anticipated before the end of January. About 15 Northeastern stacks are in blast, and there are possibly 25 furnaces operating throughout the United Kingdom. Foreign ore continues quiet.

Finished iron and steel makers are heavily sold ahead on shipbuilding, structural and engineering materials, and considerable activity seems probable for several months. The larger plants are awaiting fuel adjustments and better supplies of raw materials before resuming operation. Staffordshire marked bar iron has been raised 10s. per ton to £14 10s. (3.03c. per lb.) on either domestic or export sales.

November exports of pig iron totaled 4282 gross tons, of which the United States received only 4 tons. The total of iron and steel exports in November was 166,363 gross tons.

Tin plate prices are irregular, declining with cheaper costs, but some specifications still command premiums. Demand is generally poor, consumers awaiting the delivery of orders booked several weeks ago.

Galvanized sheets are easier, with demand smaller and black sheets continue quiet.

The Continental semi-finished steel market is weak as a result of poor demand and the reentry of French sellers because of cancellations by domestic consumers.

Sheet bars are now £5 6s., f.o.b. The finished material market is steady, as most Belgian and Luxembourg and all German plants are heavily engaged.

The European Raw Steel Cartel has decided to reduce the annual rate of output for the first quarter of next year by 1,500,000 tons.

GERMAN ACTIVITY INCREASES

Shipbuilding Plants Busy—Pig Iron Output Higher—Scrap Buyers Cooperate

BERLIN, GERMANY, Nov. 25.—The latest fortnightly report on employment shows a decline in the number of unemployed to about 1,300,000. The allowances to the unemployed will be replaced by an unemployment insurance law to become effective next April. This provides for payment of premiums by the employers and employees. In the labor unions of the metal trades, unemployment declined from 21.7 per cent to 18.1 per cent, between July and October of this year.

The steel market is slightly less active and steel syndicate prices continue unchanged. The engineering industry reports a moderate improvement with unemployment in the engineering labor unions off from 24.1 per cent in March to 19.5 per cent in September. Those on part-time work fell from 36.2 per cent in March to

21.4 per cent in September. The electric equipment manufacturers are well occupied, one of the large sources of business being the electrification of the Berlin city railroads. The shipyards are booking both domestic and foreign contracts for ships and repairs. In the shipbuilding industry the Werft A. G. Weser of Bremen and the Vulkanwerke of Hamburg and Stettin have agreed to merge. In addition, a corporation to include all North Sea yards is contemplated.

The ore market is strong, with increasing tonnages of Siegerland ores being sold, and prices firm. There is an active demand for minette and northern French ores and a shortage in minette is developing. There is also a shortage of manganese ore for prompt delivery and prices were advanced considerably early in November.

A cooperative purchasing organization for scrap buying has been formed by the chief western mills. This includes the United Steel Works, Kloeckner, Mannesmann Tube Co., Fried. Krupp A. G., Gutehoffnungshutte, Eisen & Stahlwerk Hoesch and Henschel &

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.85 per £ as follows:

Durham coke, f.o.b.	£1 5s.	to £1 10s.	\$6.06	to \$7.27
Bilbao Rubio ore†	1 2		5.33	
Cleveland No. 1 fdy. (nom.)	4 7½	to 5 17½	21.21	to 28.49
Cleveland No. 3 fdy.	4 5	to 5 12½	20.61	to 27.28
Cleveland No. 4 fdy.	4 4	to 5 11½	20.36	to 27.03
Cleveland No. 4 forge	4 3½	to 5 10½	20.12	to 26.79
Cleveland basic (nom.)	3 15	to 3 15½	18.18	to 18.30
East Coast mixed...	4 10	to 4 12½	21.82	to 22.42
East Coast hematite	4 8		21.34	
Rails, 60 lb. and up	7 15	to 8 0	37.58	to 38.80
Billets	7 10	to 8 15	36.37	to 42.43
Ferromanganese ...	16 0		77.60	
*Ferromanganese (nom.)	15 10		75.17	
Sheet and tin plate bars, Welsh	6 15	to 7 10	32.73	to 36.37
Tin plate, base box.	1 0¾	to 1 2½	5.03	to 5.46
Black sheets, Japanese specifications	15 5	to 15 15	74.11	to 76.53
Ship plates	7 15	to 8 5	1.67	to 1.78
Boiler plates	10 15	to 11 5	2.32	to 2.43
Tees	8 12½	to 9 2½	1.86	to 1.97
Channels	7 17½	to 8 7½	1.70	to 1.81
Beams	7 12½	to 8 2½	1.65	to 1.75
Round bars, ¾ to 3 in.	8 5	to 8 15	1.79	to 1.89
Steel hoops	10 10	and 11 0*	2.28	and 2.39*
Black sheets, 24 gage	12 10	to 12 15	2.70	to 2.76
Galv. sheets, 24 gage	16 10	to 17 0	3.56	to 3.68
Cold rolled steel strip, 20 gage, nom.	18 0		3.91	

*Export price.

†Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron:(a)				
Belgium	£4 5s.	to £4 10s.	\$20.61	to \$21.82
France	4 5	to 4 10	20.61	to 21.82
Luxemburg	4 5	to 4 10	20.61	to 21.82
Basic pig iron:				
Belgium	3 14	to 3 15	17.94	to 18.18
France	3 14	to 3 15	17.94	to 18.18
Luxemburg	3 14	to 3 15	17.94	to 18.18
Coke	0 18		4.37	
Billets:				
Belgium	5 2½	to 5 5	24.85	to 25.46
France	5 2½	to 5 5	24.85	to 25.46
Merchant bars:				
Belgium	5 10	to 6 0	1.21	to 1.32
Luxemburg	5 10	to 6 0	1.21	to 1.32
France	5 10	to 6 0	1.21	to 1.32
Joists (beams):				
Belgium	5 12½	to 6 0	1.24	to 1.32
Luxemburg	5 12½	to 6 0	1.24	to 1.32
France	5 12½	to 6 0	1.24	to 1.32
Angles:				
Belgium	5 15		1.25	
½-in. plates:				
Belgium (nominal)	7 0	to 7 2½	1.54	to 1.56
Germany (nominal)	7 0	to 7 2½	1.54	to 1.56
¾-in. ship plates:				
Belgium	6 7½	to 6 12½	1.40	to 1.44
Luxemburg	6 7½	to 6 12½	1.40	to 1.44
Sheets, heavy:				
Belgium	6 3	to 6 4	1.33	to 1.34
Germany	6 3	to 6 4	1.33	to 1.34

(a) Nominal.

Sohn, G.m.b.h. An effort will be made to combat the tendency toward speculation. Scrap is still under control of the government and the regulation of exports by licensing has been quite severe of late. In consequence, exports of scrap have declined from quarter to quarter, while imports have increased. This has been the result of the increases of pig iron production. October output totaled 935,279 metric tons, compared with 740,741 tons in October, 1925. Since Jan. 1 of this year the monthly output of pig iron has increased about 36 per cent. The effect of reorganization and more efficient operation of furnaces is shown in a comparison of output and the average number of furnaces in blast since 1920.

Year	Total Furnaces	Average in Blast	Output Per 24 Hr. (Metric Tons)
1920	237	127	35,997
1921	239	146	37,465
1923	218	66	40,860
1925	211	83	47,820
1926 (10 mos.)	210	97	52,135

With 30 furnaces less in blast this year than in 1920, the daily rate of production has averaged more than 16,000 tons higher.

GERMANY MAY RAISE TARIFF

Depends on France's Permitting More Imports
—United Steel Works Extends Control

BERLIN, GERMANY, Nov. 25.—While the Minister of Industry has expressed to the Reichstag the Cabinet's approval of the International Steel Cartel, he has pointed out that adequate protection of the steel consuming industries of Germany will be insisted upon, both as to cost of raw materials and extension of export markets. Germany, says the Minister of Industry, does not consider it obligatory to retain the present iron and steel import duties, without which the cartel probably would not satisfactorily operate. Consequently, unless France grants facilities for the import of German manufactured metal products by reduction of import duties, Germany will consider tariff action before April 1, 1927.

Mergers and negotiations for mergers continue a feature of industrial activity in Germany. The plan to combine, in a single corporation, the Gelsenkirchen Bergwerks, Deutsch-Luxemburg and Bochum Cast Steel Co., formerly known as the Rhine-Elbe Union, will be voted on by the stockholders at a meeting, Dec. 9.

Establishment of a corporation, including the principal manufacturers of high grade steels, is apparently assured. Until recently this proposed corporation, the Vereinigte Edeltahlwerke, has existed only as a "study corporation." Now, it is to be incorporated with a majority stock control in the hands of the United Steel Works. Influence of the United Steel Works will be further extended with the recent formation of the Central German Steel Corporation (Mitteldeutsche Stahlwerke A. G.). Of the total capital stock of the new company, the Linke-Hofmann-Lauchhammer A. G. receives shares to the extent of 33,000,000 marks in exchange for its steel, rolling mill and mining interests at Lauchhammer, Riese, Groda, Burghammer and elsewhere and the United Steel Works receives 12,000,000 marks of stock for its steel and rolling mill at Brandenburg. Ultimately the United Steel Works will have a controlling interest in the Central German Steel Corporation as the director general, Herr Flick, owns about 50 per cent of the stock of the Linke-Hofmann-Lauchhammer A. G., which, in turn, controls a half interest in the Upper Silesian works. Including these Silesian interests the United Steel Works will control 54 per cent of the quotas in the Pig Iron Syndicate. Combined, the Central German Steel Corporation and the United Steel Works control about 7,900,000 tons of steel production, or more than half the total quotas in the German Raw Steel Syndicate and with the Silesian mills included, 49.7 per cent of the quotas in the Steel Bar Syndicate.

SOUTH AFRICAN DEMAND

Active, Despite Growing Steel Industry and
Large Imports—Good Buying of Hoops

JOHANNESBURG, SOUTH AFRICA, Oct. 26.—The South African steel industry is growing. At present there are three steel works in South Africa of importance, in addition to a number of small foundries and machine shops. One of the most important of the steel companies is the Union Steel Corporation, Ltd., with works at New Castle. The first blast furnace of this company was blown in during April and is producing 500 tons of foundry iron a day. The second furnace will go into blast some time in November and a third is expected to be in operation by April, 1927.

At Vereeniging in the Transvaal a steel works is producing about 4000 tons a month, principally open-hearth steel. Increase of this capacity to between 6000 and 7000 tons a month will be effective in a few weeks. The most recently established steel works is the Dunsward Iron & Steel Co. in Benoni, near Johannesburg. The plant covers about 33 acres and its monthly production is about 6000 tons of Siemens-Martin (open hearth) steel and 5000 tons of Thomas steel. All these steel works supply material to the South African Railways, producing rails and other track materials, rods, bars, beams and plates. The Dunsward works also has a tube mill.

Demand in the South African market is heavy, despite increasing production in the domestic field and larger imports than ever before. There is a particularly active market for steel plates, galvanized steel sheets, heavy beams and a fair inquiry for rails. There is also a good market for light gage black sheets, with most purchasers placing orders in Germany and Belgium. At present there is active importing of hoops in South Africa and East Africa, the local mills not having entered into this branch of steel production. While there has been some buying of French and Belgian hoops, the British, American or German product is preferred and from £1 to £1 10s. per ton less is usually offered for the French and Belgian product. German hoops are rather high in price since the formation of the hoop iron syndicate in Germany and deliveries are becoming extended. The usual specifications are hoops of B. W. G. No. 20, ¾-in. or 1-in., 56-lb. coils, folded three times.

DUMPING NOTICES NUMEROUS

About 50 Issued on Shipments from Germany
of Hoops, Bands, Bars and Plates

NEW YORK, Dec. 14.—Importers of steel in the United States continue active but the volume of current business is not so large as earlier in the year. While prices are off slightly from the peak reached soon after the formation in Europe of the International Steel Cartel, quotations are still higher than many American consumers seem willing to pay. French and Belgian bars are quoted at about 1.80c. to 1.85c. per lb., base, duty paid, and German material ranges from 1.85c. to 1.90c. per lb., base, on most business. There is still considerable activity in the importation of hoops and bands with sales reported at low prices for 6 in. and wider. Stone & Webster, Boston, are understood to be inquiring for about 600 tons of reinforcing bars, for the Susquehanna Dam at Conowingo, Md.

Sales of German steel have again been temporarily curtailed by threatened action under the Anti-Dumping Act. Several importers of German material have received notices from the Customs collector at the Port of New York. In all, it is reported that about 50 notices have been issued to importers on various shipments believed to be in violation of the act. The majority of these notices have been against shipments of hoops, bands, steel bars and universal plates. No structural material is included, as the greater part of the imports of structural steel is apparently being brought in from Belgian and a few French mills. One

importer, representing a large Belgian steel works, reports the sale of several thousand tons of structural steel in the past month.

According to evidence in the hands of the Treasury Department at Washington, in one instance a purchase price on steel bars was 1.69c. per lb. at the mill in Germany, while the current domestic price in Germany, at the time of the purchase, was 1.83c. per lb. Importers who have received these notices claim that on bars, particularly corrugated material for reinforcing, there is no domestic market in Germany, so that the only guide to dumping is the so-called "world-market" price at which German mills are selling to customers abroad.

One importer in New York, representing a German mill, has received a notice of dumping in Baltimore on a shipment of special material from Germany and states that a fine of \$1,400 was levied, which was paid

under protest. The protest is understood to be under consideration by the proper authorities, although this cannot be confirmed in Washington.

Export trade continues light. One of the larger recent inquiries, 55,500 base boxes of oil-can tin plate for the Nippon Oil Co. in Japan, was distributed to three of the large Japanese export houses, each receiving 18,500 boxes to be placed with American makers. The inquiry of the Imperial Government Railways in Japan for about 8000 tons of 100-lb. rails and accessories is understood to have been placed with a French mill through one of the largest Japanese trading companies. Bids have been opened, but awards not yet announced, on 1000 tons of copper-bearing steel sheets for the Imperial Government Railways. Japanese merchant buying is quiet and but little inquiry from this source is expected until after the first of the year.

METRIC BILLS UP AGAIN

May Be Referred to Bureau of Standards for a Report—Opposition Strong

WASHINGTON, Dec. 13.—Opponents of the metric bills do not believe they will be reported to the present session of Congress and feel that their favorable consideration at any time in the future is more remote than ever.

They reached these conclusions following a hearing on the metric bills on Friday and Saturday of last week before the Senate Committee on Commerce, of which Senator Wesley L. Jones, of Washington, is chairman. Whether or not further hearings will be held by the committee will be determined at a future meeting. It is doubted that there will be any more. Both Senator Jones and Senator Johnson, the latter from California, evidently were inclined to dispose of the matter through passage of a joint resolution by Congress calling upon the Department of Commerce to make an investigation into the subject and make a report to Congress.

Two Bills Might Prove Unconstitutional

Proponents of the measure said they had no objection to such a resolution, though it is a far milder proposal than the two bills on which hearings were held, one having been introduced by the late Senator McKinley of Illinois and the other by Senator Gillett of Massachusetts. Both of these bills would require the Director of the Bureau of Standards to put the metric system into effect by the Government. This proposal, opponents of the measure say, would be unconstitutional, inasmuch as Congress cannot delegate power of legislation to an administrative department of the Government. A majority of members of the committee apparently takes the view that Congress would not pass the bills as now framed, and except for Senator Couzens of Michigan, the few members of the committee who attended the hearing seemed to be at least unsympathetic toward it. Senator Johnson, however, assisted proponents of the measure in getting statements before the committee when opponents were being heard.

When the committee learned that the Bureau of Standards in 1916 had made a report to Congress on the metric system and recommended its adoption, there seemed to be less chance of the committee having a joint resolution for investigation by the Department of Commerce introduced. Nathan B. Williams, associate counsel, National Association of Manufacturers, opposed such an investigation on the ground that it would mean needless expenditure of public money. Senator Johnson indicated, though, that the Bureau of Standards might make a report from material already at hand, of which there is a great volume.

Serious Opposition Develops

Mr. Williams pointed out that the proposed legislation has been defeated repeatedly, that the subject has been gone over any number of times and that there is no reason for further inquiry. He recited the oppo-

sition of industrial interests of the country to the metric system and said that if it were considered a good thing it would have been adopted, inasmuch as Congress in 1866 authorized its use, but did not seek to make it compulsory.

Alfred P. Thom, appearing as counsel for the American Railway Association, also opposed the bill because of the enormous costs the change would mean to the railroads and ultimately to the shippers. He said the association did not oppose the suggested investigation, but saw no necessity for it. C. C. Stutz, secretary of the American System of Weights and Measures, spoke briefly in opposition to the bill and said that, if further hearings were held, he would like to be informed, so that he might have members of the association appear in opposition to the proposed legislation. Hearings on the metric bill introduced by Representative Britten of Illinois were held at the previous session of the present Congress.

Bureau of Standards Celebrates Quarter Centennial

Celebration of the twenty-fifth anniversary of the establishment of the Bureau of Standards, Washington, took the form of a dinner at the New Willard Hotel, on Dec. 4. The bureau has issued a mimeographed report of the addresses delivered on that occasion. Dr. George K. Burgess, director of the Bureau, was toastmaster. The chief talk of the evening was by Herbert Hoover, Secretary of Commerce, who spoke particularly on the devotion to the ideals of science and to the ideals of public service shown at every step in the growth of the bureau. He credited to the development of science through such agencies as this bureau the fact that the Malthusian theory of over-population had not been borne out.

Other speakers included members of Congress, officers of the bureau, George B. Cortelyou, president Consolidated Gas Co., New York, and formerly Secretary of Commerce, and Dr. S. W. Stratton, who was, for the first 23 years of the bureau's history, its director. Doctor Stratton paid particular attention to the friendly relations between the Bureau of Standards and other bureaus of the Government with which it has long been cooperating. He spoke particularly of the development of a device for plotting the result of a salvo of shells from heavy guns in the Navy. This was of aid in the gunnery which helped to keep the Germans off the seas during the World War. The radio direction finder was another of the bureau's contributions to the same cause. He paid particular tribute to many of the employees of the bureau who had given conspicuous service in the development of its activities.

Work on the new American Steel & Wire Co., South Works, Worcester, Mass., steel rolling mill unit is progressing rapidly. The billet storage unit is 20 per cent completed and the billet mill extension 50 per cent completed. The electric sub-station has not been started, but shipping room alterations will shortly be under way.

Development in Coal Utilization

(Continued from page 1703)

of significance in relation to coal blending. This aspect of the subject has been studied by Forster, Sensicle and Thaü, with results which lead to similar conclusions. These investigations are of considerable interest, since a knowledge of the conditions prevailing during the coking process is a necessary preliminary to the design of efficient coke ovens. Attention is being focused upon this point, and interesting developments are taking place in which the width of the oven is decreased. The claims made for such a modified design are that (a) shorter periods can be used with subsequent increase in the output of the ovens, (b) the coke is more uniform, and (c) coke suitable for metallurgical purposes can be made from coals hitherto considered unsuitable.

What the Furnace Needs

A most fascinating but difficult problem is encountered in the study of the properties of coke. What properties are really required in blast furnace coke and what is their order of relative importance? Is it desirable that a coke should possess high reactivity or is this property relatively unimportant when compared with such factors as the percentage of ash present or the hardness of the coke?

These problems have been attacked in America by Sherman, Perott, Kinney and Fieldner, who made use of an experimental producer with arrangements whereby samples of gas could be drawn from various levels in the fuel bed and in the stack. Their results seem to indicate that the nature of the combustion at the tuyères is influenced to only a minor degree by the chemical properties of the coke. This broad conclusion, which suggests that the capacity of the coke to withstand shock and abrasion is more important than its chemical properties, has, however, not yet been accepted universally. Investigations of a similar character are being carried out in England under the auspices of the National Federation of Iron and Steel Manufacturers.

A considerable number of investigators have attempted to determine the so-called reactivity and combustibility of cokes, but with our present knowledge it is not possible even to define precisely what is meant by these terms. The investigators are attempting to establish relationships between the chemical activity and physical properties of coke. Factors such as the percentage of ash and mobile matter, the nature of the ash, the porosity, adsorption and mechanical strength have been examined, but the present difficulty is experienced not only in devising methods for measuring these various factors but in distinguishing their individual effects. This problem has not been sufficiently elucidated for any definite statements to be made at the moment.

Reactivity of Coke

One aspect of the question is being investigated jointly by the Federation of Iron and Steel Manufacturers and the Fuel Research Division. A method has been elaborated for the determination of the reactivity of coke by its action on carbon dioxide under standard conditions. The important fact has emerged that the

reactivity of coke determined in this way may vary during its exposure to the action of the carbon dioxide. Certain types of coke exhibit high reactivity which, on further exposure, decreases to a constant value. Metallurgical coke exhibits only a relatively low initial reactivity, but at the same time a relatively small decrease during the treatment, whereas cokes with a high initial reactivity sometimes show a relatively large and rapid decrease.

An entirely new field has recently been opened up by the investigations of Lessing, Cobb, Marson and Pexton. The early work of Lessing carried out for the Fuel Research Division drew attention to the part played by the inorganic constituents of coal during carbonization. Lessing and Banks found that the addition of small amounts of certain inorganic substances had a profound influence upon the structure and amount of coke produced when sugar and cellulose were carbonized. This work was then extended to the case of coal.

Effect of Certain Additions

Cobb and Marson investigated the effect on the coke produced of adding silica, calcium oxide, iron oxide, and sodium carbonate, etc., to the coal before carbonization. They found that this treatment increases the reactivity of the coke to steam and carbon dioxide to a remarkable extent. In one series of experiments the amount of steam decomposed under certain standard conditions was 61 per cent with coke from the untreated coal, 82 per cent when calcium oxide had been added, 91 per cent with iron oxide, and 98 per cent with sodium carbonate. These results indicate avenues of investigation which may have a profound influence, not only upon the process of low-temperature carbonization, but also upon the coke oven and the iron and steel industries.

In dealing with the preparation of coal for the market, the importance of obtaining coal with a low ash content was developed. It would appear, however, that if the properties of coke may be modified by the addition of inorganic substances, the process of preparing coal for the market may possibly in the future involve the addition of critical amounts of certain inorganic compounds to the coal, as well as the removal of other inorganic compounds. In such conditions the methods of dry cleaning would not be so suitable as those in which water is used.

In some preliminary experiments carried out at our fuel research station it has been found that the reactivity of coke may be varied by altering the conditions of carbonization. An example of this was observed in the coke produced during the carbonization of sized (nut) coal at high setting temperatures, when the throughput of a particular plant was double the normal capacity of the plant. The coke produced was found to be more readily combustible than the normal coke.

Production of Free-Burning Coke by High-Temperature Methods

The plant used is the setting of four Glover-West retorts originally installed at the fuel research station. The retorts are 33 in. by 10 in. at the top by 21 ft.

Table I. Yields of Products Obtained by Carbonization of Medium-Caking Coal at Temperatures from 400 to 700 Deg. C.

	Carbonizing Temperature, Deg. C.					
	400	450	500	550	600	700
	Percentage by Weight of Coal					
Coke	88.2	83.75	80.50	77.00	75.00	71.00
Tar	3.9	5.62	7.06	8.00	7.60	6.24
Aqueous distillate	5.6	7.01	7.92	7.70	8.12	7.18
Gas	2.2	3.32	4.05	7.14	9.10	14.58
Loss	0.1	0.30	0.47	0.16	0.18	1.00
Water produced (net)	2.2	3.61	4.52	4.30	4.72	3.78
Gas, cu. ft. per 100 lb.	34.5	56.2	70.9	126.0	194.3	356.5
Coke (dry):						
Volatile matter	16.5	13.1	11.6	8.1	5.4	3.2
Tar (dry):						
Specific gravity at 15 deg. C.	0.958	0.980	0.986	1.015	1.039	1.078
Gallons per ton of coal	9.1	12.8	16.0	17.65	16.4	12.9

high. There are seven heating chambers and two waste-gas circulating chambers.

The amount of treated coal (Mitchell main gas nuts, South Yorks) has been increased from the rated amount of 2.5 gross tons per retort per day to 7 tons, the average temperatures of the setting being maintained at the original value, viz., 1260 deg. C. No advance on the throughput of 7 tons has yet been achieved, as even so a fairly high proportion of partially carbonized coal is extracted with the coke.

The coke is of more open texture than that normally produced, and the average percentage of volatile matter is higher. When the coke is screened, however, the breeze (less than $\frac{1}{8}$ in.) is found to contain all the high-volatile coke, and the lump coke contains little more volatile matter than in normal practice.

Burns More Freely

Ease of ignition and combustibility of the coke have been compared and it has been found that the "new" coke burns more freely than the old. It is readily ignited in an ordinary domestic grate by means of seven 7 in. by $\frac{1}{2}$ in. by $\frac{1}{2}$ in. chips of yellow deal and one full sheet of a daily newspaper. It also gives a brighter fire and, when allowed to burn out, does not leave so much unburned fuel.

It is, however, not so free burning as smokeless fuel produced by carbonization at low temperatures (about 600 deg. C.) and experiments are being continued to determine whether this standard may not be achieved.

The immediate interest of the investigation lies in the successful working of the plant at more than 100 per cent increase on the rated throughput and the production of a relatively free-burning coke in gas retorts of existing design. Table II shows the comparative yields with throughputs of 2.5 and 5 gross tons per retort per day.

Attention is directed to the increase in the thermal yield of gas per retort per day (40.5 per cent), the decrease in the thermal yield of gas per ton of coal (29.9 per cent), the increase in the calorific value of the gas (100 B.t.u.), the increase in the yield of tar (18.3 per cent), the decrease in the yield of lump coke over $\frac{1}{8}$ in. (3.7 per cent), and the increase in the fuel expenditure (24.4 per cent). The fuel expenditure per

Table II. Illustration of Preliminary Experiments on the Production of Fuel-Burning Coke in High-Temperature Retorts

(Coal used: Mitchell Main Gas Nuts)		
Throughput		
Tons (2240 lb.) per retort per day	2.50	5.01
Moisture in coal as charged, per cent	0.7	2.3
Duration of test, hours	72.0	96.0
Coal		
Total carbonized, tons (2240 lb.)	30.0	80.3
Steam		
Rate, lb. per hr.	187	473
As per cent of coal	20.05	25.24
Coke		
Over $\frac{1}{8}$ in., cwt.	12.04	11.6
Volatile matter, per cent	2.42	3.0
Through $\frac{1}{8}$ in., cwt.	1.23	2.9
Volatile matter, per cent	...	12.8
Gas		
Yield per retort per day, cu. ft.	52,010	60,170
therms.	244.0	342.9
Yield per ton (2240 lb.) of coal, cu. ft.	20,810	12,010
therms.	97.6	68.44
Calorific value, B.t.u. per cu. ft.	469	570
Specific gravity (air = 1)	0.424	0.410
Tar (dry)		
Yield per ton (2240 lb.) of coal, gal. (vol. of 10 lb. of water)	13.35	15.80
Specific gravity at 15 deg. C.	1.100	1.088
Ammonium Sulphate		
Yield per ton of coal, lb.	22.2	25.45
Carbonizing Temperature		
Mean of combustion chambers, deg. C.	1,260	1,260
Fuel Gas		
Fuel gas per hour, cu. ft.	6,010	7,240
therms.	17.2	21.4
Fuel gas per therm of coal gas made, therms.	0.42	0.370

NOTE: 1 therm = 100,000 B.t.u.

therm (100,000 B.t.u.) of gas produced is lower by 11.9 per cent.

A considerable amount of work is being carried out at the present time both in the United States and in Europe on the variations in combustibility which may be effected by blending different varieties of coal and also by blending coal with coke breeze under both high and low-temperature conditions.

Heavy Building Construction Continues

November construction volume in the 37 States east of the Rocky Mountains is reported by F. W. Dodge Corporation at \$487,000,000. While this represented a seasonal decline of 6 per cent from October, it showed an increase of 3 per cent over November of last year. During the first 11 months of 1926, new construction in these States aggregated \$5,812,519,000, an increase of 6 per cent over the previous record, which was the \$5,477,581,000 reported last year.

November building still continues to show a preponderance of residential construction. This amounted to nearly \$230,000,000, or 47 per cent of all construction. Industrial buildings and commercial buildings stood second and third, at \$64,781,000 and \$59,657,000 respectively. These were 13 and 12 per cent of the total.

Wholesale Prices, 1890 to 1925

Tables and graphs make up most of the 255-page publication on Wholesale Prices, 1890 to 1925, issued as Bulletin No. 415 of the United States Bureau of Labor Statistics. Copies of this bulletin may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at 30c. each. The book is of particular interest as giving a long-time record of price movements of a large number of commodities.

Annual figures are given over the whole range, for the ten price groups reported upon monthly by the bureau. These are extended into monthly figures for the period beginning with 1916, and each large group is broken up into three or four small ones, with monthly figures for each. Other tables give annual averages for a wide variety of individual items, as well as some

of the groups. In an appendix is shown the weighting used in constructing index numbers of wholesale prices. This shows the relative importance of commodities on this basis. Another appendix gives wholesale prices in other countries.

Fewer Electric Industrial Trucks Shipped

November shipments of electric industrial trucks and tractors are reported by the United States Department of Commerce at 123, compared with 132 in October and with 124 in November, 1925. The reduction was in trucks other than tractors, for domestic use, which dropped from 97 to 86. Domestic tractors remained at 18 as in October, while exports of the two types increased from 17 to 19.

Compared with the third quarter of the year, November shows a slight gain, for the monthly average in that third quarter was 13 tractors and 86 of other types for domestic use, and only three for export. The total shipments for the first 11 months of the year aggregated 172 tractors and 1032 other types for domestic use, plus 93 export units. This may be compared with 12 months of 1925, in which shipments were 192 tractors and 1120 other types, with 128 additional for export.

Slight Increase in Abrasives

Establishments engaged primarily in the manufacture of emery wheels and other abrasive and polishing appliances reported products valued at \$25,582,204 in 1925, at the biennial census of manufactures, according to the Department of Commerce. This was an increase of 1.1 per cent, as compared with \$25,306,812 for 1923, the last preceding census year.

Credit Is Dominant Economic Factor

(Concluded from page 1709)

infinitesimal. As the boundaries of credit are widened, the ties which bind society together are multiplied."

Engineer Needed in Safe Marketing of Credit

The growth of credit as an instrument in business is placing new demands on the engineer, said the speaker. On this point his remarks were as follows:

"Facilities for moving credit are a welcome addition to our economic equipment, but we must make sure that the credit which is dealt in is sound and not adulterated. . . .

"In seeking capital for an enterprise technically known as promotion, there are three agencies which cooperate: first, the engineer and accountant who investigate the physical property; second, the legal expert who scrutinizes the proposal that it may conform with corporate law, and, third, the investment banker, who determines the character of the issue and the best method of distributing the offering. . . . His (the engineer's) responsibility is great, and so far as I am aware, has not been abused. How far his power goes, after his data have been assembled, you are more competent to judge than I. If his investigation be purely formal, to be lightly set aside when it does not accommodate itself to ambitious financial plans, a grievous wrong may be committed.

"The engineering and allied professions have a great opportunity to insist upon professional standards

which will command the confidence of the investing public. There may be practical objections; but why should there not be a universal custom of signed statements by engineers to accompany the signed statements of legal firms and accountants which appear in investment circulars? It cannot be expected that the analyst—whether engineer, accountant or statistician—shall be held legally responsible if the credit risk goes wrong, for there may be mismanagement after the credit is issued; but there is a moral responsibility on the part of those who create the credit offering and those who distribute and merchandise it to make certain that so long as the credit is in their hands it is sound and will prove a blessing to those who use it.

"Like electrical energy—a mysterious force in the physical world—credit is capable of most beneficent service to the wants of society. Each, however, can be perverted by the slightest error, to do untold damage. Governments have misused credit and banking institutions dishonored the trust placed in them. Fortunately we have a reasonable assurance that such errors will not be repeated on any widespread scale in this country. Credit bureaus, under the stimulating activity of the National Association of Credit Men, are endeavoring to check abuses in the merchandising of goods. State legislatures by blue-sky laws are seeking to prevent the sale of fraudulent and imprudent securities. The misbranding of credit is so easy, however, that its protection should not be left to governmental officials and organized private agencies, but should be a matter of concern to every individual and profession."

MORE TIN PLATE MADE

1925 Census Shows Gain of 10 Per Cent Over 1923—Large Increase in Terne Plate

WASHINGTON, Dec. 9.—Preliminary data collected by the Department of Commerce at the biennial census of manufactures give production of tin plate as 3,480,401,286 lb. (1,740,201 net tons), valued at \$179,381,673, in 1925. Production of terne plate for that year is given as 181,436,381 lb. (90,718 net tons), valued at \$9,229,176. Figures of the Bureau of the Census giving the value are based on the f.o.b. plant

Manufacture of Tin Plate and Terne Plate in the United States

	In Thousands of Dollars and of Pounds		Per Cent of Increase or Decrease (—)
	1925	1923	
Number of establishments reporting	25	30	—16.7
Products, total value	\$190,918	\$165,587	15.3
Tin plate and terne plate:			
Pounds	3,661,838	3,296,562	11.1
Value	\$188,611	\$162,476	16.1
Tin Plate—			
Pounds	3,480,401	3,159,251	10.2
Value	\$179,382	\$154,636	16.0
Coke plate—			
Pounds	2,424,408	3,082,382	—21.1
Value	\$175,626	\$149,769	17.3
Charcoal plate—			
Pounds	55,994	70,868	—26.2
Value	\$2,755	\$4,867	—22.8
Terne plate, including long terne—			
Pounds	181,436	137,361	32.1
Value	\$9,229	\$7,839	17.7
All other products, including tin dross, scruff, scrap, etc., value	\$2,207	\$3,111	—29.5
Equipment			
Number of dipping sets at end of year	568	812	—30.1
Usually employed on tin plate	525	765	—31.4
Usually employed on terne plate	43	48	—10.4
Daily capacity, single turn, pounds	6,924	6,189	12.0
Tin plate	6,545	5,852	11.8
Terne plate	379	337	15.3

price. On this basis these figures show a price of \$5.15 per 100 lb. on tin plate in 1925.

Production of tin plate showed increases of 10.2 per cent in quantity and 16 per cent in value, as compared with 3,159,250,830 lb. (1,579,625 net tons) valued at \$154,636,231 for 1923, or on a basis of \$4.86 per 100 lb. Production of terne plate increased 32.1 per cent in quantity and 17.7 per cent in value, as compared with 137,300,933 lb. (68,651 net tons) valued at \$7,839,834 for 1923.

Where the Plants Are

The 25 establishments reporting for 1925 were all operated as dipping departments of rolling mills. Of these establishments nine were located in Pennsylvania, six in Ohio, five in West Virginia, two in Indiana, two in Maryland, and one in Illinois. In 1923 the production of tin plate was reported by 30 establishments, the decrease to 25 in 1925 being the net result of a loss of seven establishments and a gain of two. Of the seven establishments lost to the industry one was dismantled before the beginning of 1925 and six were idle during the entire year.

The table shows the quantities and values of the several classes of tin plate and terne plate products.

German Government Steel and Industrial Corporation Offers Bonds Here

The United Industrial Corporation of Germany (Vereinigte Industrie-Unternehmungen A. G.), a Government owned and controlled organization known as VIAG and having steel plants, aluminum plants, nitrate plants, electric power plants and other industrial units, is offering for sale in the United States \$6,000,000 worth of 6½ per cent sinking fund gold debentures. The offering has been underwritten by the banking firms of Harris, Forbes & Co., Lee, Higginson & Co. and Brown Brothers & Co. Some of the plants owned by the German Government were built or acquired during the war, and at the close of the war it was deemed desirable to vest their ownership and management in a corporation, in which the Government continues to maintain a controlling interest. Included in the assets are the Deutsche Stahl & Walzwerke A. G., which has a steel plant which the Government owns virtually in full, and the Ilseeder Steel Corporation, in which the Government has a 25 per cent interest.

Machinery Markets and News of the Works

CURTAILMENT CONTINUES

Machine Tool Business Is Restricted but Better Than Expected

Standard Oil Co. of New Jersey Inquires for 14 Heavy Tools—Illinois Steel Co.'s Orders Exceed \$100,000

REPORTS of curtailment of machine tool buying continue, but in some quarters there is a degree of optimism over the fact that orders are in larger volume than had been expected this month. Those who depend largely on the automobile industry for business are having the most difficulty in attaining their sales quotas, as the automobile manufacturers are buying very little. An improvement in that section of the trade is expected, however, when the probable automobile demand for 1927 has become more clearly defined.

Orders of the Illinois Steel Co., referred to last week, totaled more than \$100,000, the bulk of the busi-

ness going to one large tool manufacturer. The Standard Oil Co. of New Jersey is a prospective purchaser of 14 heavy tools, on which bids are now being received. These tools are to be shipped to Texas.

Railroad buying is of small proportions, which gives unusual interest to the report that the Chesapeake & Ohio is preparing a large list of machine tool requirements, which will be submitted for bids early in the new year. The list of the Norfolk & Western Railroad is still pending and in New York there is the large inquiry of the Brooklyn-Manhattan Transit Co., on which action has been long delayed.

November machine tool orders, according to the National Machine Tool Builders' Association, were considerably below those of October, but still were 31 per cent above the low point of the year, which was in May. Only four months of the year were better than November, these being March, June, September and October. November shipments were large, being exceeded in the 11 months only by those of March and October. While orders in November of this year fell below those of November, 1925, shipments last month were larger than in the same month last year.

New York

NEW YORK, Dec. 14.

SOME machine tool selling agencies are busier than they expected to be this month, although the volume of business has shown a decline from that of preceding months. A good many quotations are being made, indicating that if current predictions of an upswing in general business early in the new year come true machine tool orders will be placed more freely. One of the largest current inquiries is from the Standard Oil Co. of New Jersey, which has asked for prices on 14 machines, including punches, shears, radial drills, engine lathes, etc., to be shipped to Texas.

A company at Hayward, Ill., has bought a throatless shear. Other miscellaneous orders of the week include a profiling machine, three hand milling machines and one bench milling machine to a magneto manufacturer at Sidney, N. Y.; a 13-in. geared-head lathe to a watch company at Waltham, Mass.; a 13-in. geared-head lathe to the Westinghouse Electric & Mfg. Co., Springfield, Mass.; a 16-in. geared-head lathe to the Big Four Railroad; three bench drilling machines to the New Haven Clock Co., New Haven, Conn.; a horizontal tapping machine to a manufacturer of tools at Huntington Park, Cal.; a jig borer to the American Brown Boveri Electric Corporation; an automatic milling machine to a Detroit brass company.

The Standard Oil Co. of New York, 26 Broadway, has plans for a one-story machine shop, 40 x 140 ft., at Port Jefferson, N. Y., to cost about \$40,000 with equipment.

The Overland Metal Novelty Co., 141 Wooster Street, New York, has leased space in the building now being completed at 233 Spring Street, for a new plant with increased capacity.

The Inwood Consumers Ice Mfg. Co., Ninth Avenue and 213th Street, New York, has awarded a general contract to the Wigton-Abbott Corporation, 552 West Twenty-third Street, for its one-story plant, 100 x 150 ft., to cost about \$100,000 with machinery. R. M. Delgrado is president.

The Associated Gas & Electric Co., 61 Broadway, New York, operating electric light and power properties in New York, Massachusetts, Pennsylvania, is disposing of a preferred stock issue to total \$9,550,000, a portion of the proceeds to be used for expansion and improvements. J. I. Mange is president.

The Commissioner of Plant and Structure, Municipal Building, New York, has plans under way for an automobile service, repair and garage building for city motor trucks, with incinerator plant at 530-40 East Seventy-fourth Street, to cost in excess of \$500,000 with equipment.

The American Character Doll Co., 67 Spring Street, New York, manufacturer of mechanical toys, has leased space in the new factory at 1027 Metropolitan Avenue, Brooklyn, for a new plant.

The Washburn Wire Co., 550 East 118th Street, New York, has leased a one-story building, 50 x 100 ft., for expansion, to be erected at 542-46 East 117th Street. John P. Walther, 103 East 125th Street, is architect.

The Bureau of Sewers, Municipal Building, New York, is said to be planning the installation of pumping equipment in connection with a new sewage disposal plant at Tannersville, N. Y., to prevent water contamination, for which a fund of \$500,000, has been authorized.

The Board of Education, Park Avenue and Fifty-ninth Street, New York, plans the installation of manual training equipment in the proposed new DeWitt Clinton High School, for which plans have been approved, estimated to cost \$3,357,000; also in the proposed four-story Richmond Hill High School, to cost \$2,074,000.

The Whitehead Metal Products Co., 261 Canal Street, New York, has leased space in buildings 8 and 9 at the Bush Terminal, South Brooklyn, for expansion.

The Atlas Steel Barrel Co., Second Street and the Boulevard, Bayonne, N. J., has awarded a general contract to the Tilt-Hargan Co., 90 West Broadway, New York, for a one-story addition.

The Board of Education, Central Rural School District No. 1, Croton Falls, N. Y., is reported planning the installation of manual training equipment in a proposed three-story junior and senior high school at Purdy Station, N. Y., estimated to cost \$200,000, for which bids are being asked on a general contract. Knappe & Morris, 171 Madison Avenue, New York, are architects.

The De Mattia Foundry & Machine Co., 6 Monroe Street, Clifton, N. J., manufacturer of rubber mill machinery, is said to be planning the erection of two additions, to cost in excess of \$50,000 with equipment, one of the structures to be used for assembling. The company has recently completed the construction of a two-story foundry, 96 x 240 ft.

The Ropke Pan & Mfg. Co., Los Angeles, manufacturer of tinware, has leased the two-story factory, 80 x 100 ft., at 161 Ogden Street, Newark, for an Eastern branch plant.

The company also plans the establishment of other factories in Eastern cities.

The Miner-Edgar Co., foot of Blanchard Street, Newark, manufacturer of lacquers, etc., has acquired about 9 acres at Elizabeth, N. J., fronting on the line of the Central Railroad of New Jersey, improved with 10 one- and two-story buildings and will improve for a new plant. Dr. Henry V. Walker is one of the heads of the company.

The Borough Council, Florham Park, N. J., plans the installation of pumping equipment in connection with a proposed municipal water plant and system, for which a bond issue of \$140,000 has been approved. Edward H. Herman and Ernest Lanning are members of the committee in charge.

The New Jersey Power & Light Co., Dover, N. J., is arranging for an increase in capitalization to carry out an expansion and improvement program during 1927, including connection with systems of affiliated organizations in Pennsylvania. The company is operated by the General Gas & Electric Corporation, 50 Pine Street, New York, which plans the construction of a new steam-operated electric power plant at Holland, about 8 miles from Easton, Pa.

The Illinois Stoker Co., Alton, Ill., manufacturer of forced and natural draft chain grate stokers, has been consolidated with the K-B Pulverizer Corporation, New York, manufacturer of the Pulverburner. The new company will make stokers and pulverized fuel equipment. The New York office is at 1948 Grand Central Terminal.

The Pyrites Co., Ltd., has removed its New York offices to 350 Madison Avenue. Augustus D. Ledoux is the company's agent in this city.

The Hillsdale Plow Co., Hillsdale, N. Y., operated by William A. Mallory, Jr., is considering rebuilding the portion of its plant recently destroyed by fire, with loss reported in excess of \$75,000 including equipment.

Chicago

CHICAGO, Dec. 13.

MACHINE tool dealers in this district estimate that the total volume of sales for 1926 will exceed those for 1925 by not less than 25 per cent. Current sales are running below those in November, but December bids fair to be a good month for this time of year. Inquiry is light and widely scattered. Prices are steady, with a tendency in some lines, notably lathes and light drills, to advance.

The Mechanical Mfg. Co., Chicago, has placed seven turret lathes and is still in the market for millers, lathes, drills and several grinders. The Santa Fe is in the market for a 2-in. pipe-threading machine. An enameled products company, near Chicago, has bought a 14-in. x 6-ft. lathe. In closing against its recent list, the Illinois Steel Co. placed the lathe equipment with the Cincinnati Iron & Steel Co., through Louis Emmertman, Chicago. Three 42-in. planers and a 36-in. planer went to the Consolidated Machine Tool Corporation. Drills and other heavy equipment were taken by Niles-Bement-Pond Co.

O. P. Wodack, 5220 North Mozart Street, Chicago, will build a new one-story machine shop, 50 x 120 ft. Charles Dewey, 4800 North Kedzie Avenue, is architect.

The Standard Stamping & Perforating Co., room 421, New Era Building, Chicago, will build a two-story brick factory, 25 x 122 ft. at 4718 Fifth Avenue. J. T. Porter, New Era Building, is architect.

The Siegler Enamel Range Co., Decatur, Ill., has started the erection of a new factory to cost \$30,000.

The Coleman Hardware Co., Dwight, Ill., will rebuild its pattern department and foundry, partially destroyed by fire. The damage was about \$100,000.

The Chicago, Burlington & Quincy contemplates the erection of a pattern department at its Burlington, Iowa, shops, to cost \$60,000.

The La Salle Steel Co., agent in Chicago for the Athenia Steel Co., 135 William Street, New York, has removed its offices from 2304 South Halsted Street to 844 Rush Street, Chicago.

The Dandy Machine Specialties, Inc., formerly at 4911 North Lincoln Avenue, Chicago, has moved to its new Cicero plant at 2104 South Fifty-second Avenue, Chicago.

The Johnson Shuttle Co., 215-17 West Superior Street, Chicago, manufacturer of sewing machine attachments and equipment, has awarded a general contract to John Lundberg, 5240 North Sawyer Avenue, for a one-story addition, 75 x

125 ft., to cost about \$40,000 with equipment. Carl M. Almquist, 118 North La Salle Street, is architect.

The Minnesota Power & Light Co., Duluth, Minn., has arranged for a bond issue of \$2,700,000, a portion of the fund to be used for extensions and improvements. The company is operated by the Electric Bond & Share Co., 71 Broadway, New York. D. F. McGee is vice-president.

The Northern Pacific Railway Co., N. P. Railroad Building, St. Paul, Minn., is considering the construction of a new plant at Laurel, Mont., with main unit, 100 x 250 ft., to be used primarily as erecting and repair shops for steel cars. The project will include machine shops and a power house. The entire plant will cost approximately \$300,000. O. M. Rognan is company architect.

The J. S. Heath Co., Market Street, Waukegan, Ill., manufacturer of brass and bronze goods, expects to be in the market for machinery in the spring for its one-story plant unit, 100 x 250 ft., to cost about \$50,000, on which work will soon begin. R. O. Allexan is general manager.

The Chicago Smelting & Refining Co., 2457 South Loomis Street, Chicago, has plans for a three-story addition, 45 x 200 ft., to cost about \$85,000. Charles S. Archer, 6222 Cottage Grove Avenue, is architect.

The City Council, Fort Collins, Colo., has plans under advisement for a municipal electric light and power house to cost about \$25,000. E. A. Lawver is city engineer.

The Public Service Co. of Northern Illinois, 72 West Adams Street, Chicago, has work in progress on an addition to its steam-operated electric generating plant at Waukegan, Ill., to cost about \$1,000,000.

The Vit-O-Net Mfg. Co., 4111 Ravenswood Avenue, Chicago, manufacturer of electrical appliances, has awarded a general contract to the Chicago Industrial Construction Co., 53 West Jackson Boulevard, for a two-story and part basement addition, 65 x 100 ft., to cost close to \$50,000 with equipment. H. E. Gallup, 646 North Michigan Avenue, is architect.

The Goldner Specialty Co., 1347 North Oakley Avenue, Chicago, manufacturer of novelty furniture, is completing plans for a new three-story plant, 115 x 125 ft., to cost about \$115,000 with equipment. D. S. Klafter, 64 West Randolph Street, is architect.

Buffalo

BUFFALO, Dec. 13.

ABOUT two acres on the Hamburg Turnpike, Buffalo, has been purchased by the International Cooperage Co., Inc., Jewett Building, Niagara Falls, N. Y., for a new plant, to approximate about 50,000 sq. ft. of floor space, to cost more than \$125,000 with equipment. It is expected to begin work in the spring. For a temporary plant, pending completion of the new mill, the company has leased a portion of the H. G. Trout Iron Works, 226 Ohio Street, Buffalo, and will install equipment at once. The Niagara Falls mill will be continued in service.

The Buffalo Brake Beam Co., 245 Military Road, Buffalo, formerly known as the Acme Steel & Malleable Iron Works, has awarded a general contract to the J. W. Cowper Co., Inc., Fidelity Building, for a one-story addition, 60 x 200 ft., to cost about \$45,000 with equipment.

The White Co., 842 East Seventy-ninth Street, Cleveland, manufacturer of motor trucks, is having preliminary plans drawn for a two-story factory branch and assembling works, 175 x 350 ft., at Syracuse, N. Y., to cost about \$250,000 with equipment.

The Rand Kardex Bureau, Inc., Tonawanda, N. Y., manufacturer of office filing systems and equipment, is planning the construction of an addition to its Canadian plant on Bender Hill, Niagara Falls, Ont., to cost about \$200,000 with equipment. Work will probably begin early in the spring. The company has consented to a Federal court decision against a proposed merger of the Rand interests with the Globe-Wernicke Co., Cincinnati, manufacturer of kindred filing equipment, and each company will continue to function separately as heretofore. Plans for a consolidation of a portion of the Tonawanda plant with the Cincinnati works have been abandoned. James H. Rand, Jr., heads the Rand Kardex company.

The New York Central Railroad Co., Buffalo, has filed plans for a one-story engine house with repair facilities at 1709 Bailey Street, to cost about \$60,000 with equipment.

The Board of Education, School District No. 16, Horseheads, N. Y., is considering the installation of manual training equipment in a proposed two-story and basement high school to cost \$250,000, for which bids will soon be asked on a general contract. H. M. Haskell, Hulett Building, Elmira, N. Y., is architect.

The Crane Market

THERE is a fair volume of inquiry before the market for both locomotive and overhead traveling cranes, but prospective buyers show little inclination to close until after the first of the year. The Thatcher Co., Newark, N. J., is considering the purchase of a small cupola charging hoist. The General Engineering & Management Associates, 165 Broadway, New York, have closed on two 5-ton hand power cranes for Florida. Among active inquiries expected to close shortly are the six electric overhead cranes for the American Steel & Wire Co., the 5-ton hand power crane and six chain blocks for the Phoenix Utility Co., 71 Broadway, New York and six electric hoists for Dwight P. Robinson & Co., New York.

In the Pittsburgh territory, the Jones & Laughlin Steel Corporation, is accepting bids on 13 overhead cranes for a new seamless tube mill at Woodlawn, Pa. The Youngstown Sheet & Tube Co., is in the market for three cranes for the Campbell, Ohio, works.

Among recent purchases are:

Boston & Albany Railroad, Boston, a 20-ton locomotive crane from the Industrial Works.

Louisville & Nashville Railroad, Nashville, Tenn., a standard railroad ditcher from the American Hoist & Derrick Co.

New York Central Railroad, New York, a 5-ton crane trolley from the Niles-Bement-Pond Co.

J. J. Seguin, Quebec, a 17-ton used Brownhoist locomotive crane from A. R. Gelinias, Montreal.

Howard Ship Building & Dock Co., Jeffersonville, Ind., an 18-ton electric gantry crane from the Orton Crane & Shovel Co.

International Creosoting & Construction Co., Texarkana, Tex., two 18-ton, standard gage, steam driven locomotive cranes from the Orton Crane & Shovel Co.

New England

BOSTON, Dec. 13.

SALES of machine tools, particularly new, are few. It is believed, however, that orders for the first half of December will equal those for the corresponding period last year. Among used tools sold the past week, a large alligator shear to a Pennsylvania shop and three presses to a greater Boston shop were reported. Another jig boring machine was placed recently by a Connecticut manufacturer. Local dealers have received more inquiries the past week than for some time. Most of them, however, are for 1927 budgets and include precision tools. Very little of this business is expected to be placed this year.

The Mystic Terminal Co., Boston, has taken over the Hoosac Tunnel Docks, Mystic Wharf and other waterfront properties of the Boston & Maine Railroad and plans the immediate modernization of coal handling and other equipment. E. S. French is president.

Plans are nearing completion for repairs to the three-story, 42 x 111 ft. plant of E. W. Pierce & Chesworth, Inc., Gardner, Mass., machinery, which was recently damaged by fire. Plans are private. E. W. Pierce, 4 Broadway, Gardner, is president.

Fire last week swept the warehouse and machine shop of the Thomas A. Phelan Co., 148 Central Street, Fall River, Mass. Plans are being made for repairs.

The Kingsbury Mfg. Co., Keene, N. H., has not changed its name to the Kingsbury Machine Co., as reported in THE IRON AGE of Dec. 2, but the Kingsbury Machine Co. has been organized as a division of the Kingsbury Mfg. Co. The Kingsbury Machine Co. division will have charge of the department devoted to the manufacture of drilling machines.

A Connecticut charter has been granted the Long Security Lock Co., Hartford, Conn., with capital of \$300,000, to manufacture special locks and locking devices. The company has completed arrangements for the early operation of a local plant. George A. Long, 32 Lorraine Street, Hartford, is president.

Miller & Levi, 46 Cornhill Street, Boston, architects, will soon proceed with the construction of a one-story automobile service, repair and garage building, 140 x 157 ft., at Arlington, Mass., to cost about \$135,000 with equipment.

The Public Electric Light Co., St. Albans, Vt., is planning the installation of a hydroelectric power plant at the water-power site on the Lamoille River, near Milton, Vt., recently acquired. The company is disposing of a bond issue of \$1,000,000 to provide in part for this and other expansion. Clinton W. Tylee is treasurer.

The Board of Middlesex County Commissioners, Cambridge, Mass., will soon begin the construction of a one-story and basement power plant at East Cambridge, to cost approximately \$150,000 with equipment. The Edward C. Brown Co., 220 Devonshire Street, Boston, is engineer.

Fire, Dec. 9, destroyed a portion of the plant of the Capitol Foundry Co., Falence Street, Hartford, Conn., with loss reported at \$25,000. It is planned to rebuild. F. W. Stickle is president.

H. G. Bunnell, 56 Winchester Street, Brookline, Mass., and associates are considering the construction of a one-story automobile service, repair and garage building to cost \$150,000.

The Beacon Oil Co., 111 Devonshire Street, Boston, is considering rebuilding the portion of its power house and plant at Everett, Mass., destroyed by fire Dec. 10, with loss reported at \$200,000 including equipment.

The Felkin Sign Co., 534 Main Street, Charlestown, Mass., has taken out a permit for a new two-story plant, 45 x 70 ft., to cost about \$27,000 with equipment. John A. Quirk, 10 Tremont Street, Boston, is architect.

The receiver for the Connecticut Brass & Mfg. Corporation, Waterbury, Conn., has arranged for the sale of the branch plant of the company at Mixville, Conn. It is purposed to retain the factory of the company at Waterbury, resuming production as soon as affairs are determined by the Federal court.

Franklyn D. Warner, president Davis Arms Corporation, Norwich, Conn., in receivership for several months, has acquired the plant and property of the company at a public sale. The factory is equipped for the manufacture of single and double-barrel shot guns, on a basis of 300 and 200 per week. Mr. Warner is said to have plans under way for a reorganization of the company and resumption of operations.

South Atlantic States

BALTIMORE, Dec. 13.

A \$6,000,000 bond sale is being carried out by the Virginia Electric & Power Co., Richmond, Va., formerly the Virginia Railway & Power Co., a portion of the proceeds to be used for extensions and improvements, including acquisition of additional properties. Harry H. Hunt is chairman of the board.

The Maryland Record Co., Hagerstown, Md., recently organized to manufacture talking machine records, is completing plans for the early operation of a new factory, to have an initial output of close to 100,000 per month. Robert L. Campbell, mayor of the city, heads the company.

In connection with a proposed new plant at Richmond, Va., for which property has just been acquired, Philip Morris & Co., Ltd., 44 West Eighteenth Street, New York, manufacturer of cigarettes, is said to be planning the construction of a power house and machine shop. The entire project will cost in excess of \$400,000 with machinery.

The Roanoke Waterworks Co., Salem Avenue East, Roanoke, Va., plans extensions and improvements in its plant and system, including the installation of filtration equipment near the Falling Creek dam, to cost in excess of \$500,000. Sanborn & Bogert, 30 Church Street, New York, are engineers.

The Savannah River Electric Co., Savannah, Ga., will begin work at once on the construction of a power dam for its proposed hydroelectric generating plant on the Savannah River, about 20 miles from Augusta, Ga. The dam will be 90 ft. high and 3500 ft. long, and the power plant will be equipped for an output of 120,000 hp. The entire project will cost in excess of \$1,200,000. Preston S. Arkwright is president; Nisbet Wingfield, formerly city engineer at Augusta, is construction engineer.

The Taylor-Parker Co., Inc., Water Street and Commercial Place, Norfolk, Va., has been inquiring for an elevated tank on 75 ft. steel tower, with capacity of 50,000 gal.

The North Carolina Public Service Co., Winston-Salem, N. C., is said to be planning extensions and improvements in its local artificial gas plant and system, including the installation of a pumping station, high pressure holder of

50,000 cu. ft. capacity, and auxiliary equipment. T. R. Warren is local manager.

The Charles Schneider Baking Co., 415 I Street, N.W., Washington, will install ovens, power equipment, conveying and other machinery in the proposed two-story addition to its plant, 116 x 125 ft., to cost about \$170,000. The McCormick Co., Inc., 121-27 North Negley Avenue, Pittsburgh, is architect and engineer.

D. C. Elphinstone, 120 South Calvert Street, Baltimore, engineer, has inquiries out for a full revolving tunnel shovel, $\frac{3}{4}$ -yd. capacity, electric-operated, Marion type preferred.

The Chesapeake & Ohio Railway Co., Richmond, Va., is arranging for the early operation of the new boiler shop at its repair plant at Huntington, W. Va. It will be one story, 350 x 600 ft., with cost about \$520,000. The company proposes to concentrate all boiler work of the entire division at this point.

The Board of Education, Rocky Mount, N. C., plans the installation of manual training equipment in its proposed new high school, to cost about \$175,000, for which superstructure will soon begin.

The Sawyer Coal & Ice Co., Mulberry Street, Macon, Ga., has filed plans for a one-story addition to its ice-manufacturing plant, to cost \$25,000 with equipment.

The Hackley Morrison Co., 1708 Lewis Street, Richmond, Va., machinery dealer, has been inquiring for a number of electric motors from 15 to 20-hp. capacity.

The Carolina Iron Co., Winston-Salem, N. C., recently organized to take over and succeed to the plant and business of the Carolina Foundry & Machine Co., has plans under way for extensions and betterments, including machinery repairs and replacements. C. M. Thomas is president.

Philadelphia

PHILADELPHIA, Dec. 13.

CONTRACT has been let by the New Famous Chandler Co., 2168-70 East Fifth Street, Philadelphia, manufacturer of electric and gas fixtures, to H. F. Brown, 6127 Ridge Street, for a one-story addition.

The Baldwin Locomotive Works, 500 North Broad Street, Philadelphia, is said to be arranging for the immediate erection of a new shop at its Eddystone plant for the manufacture of locomotive tenders. Plans have also been approved for a new six-story administration building, 150 x 200 ft., at the Eddystone works. The entire expansion will cost in excess of \$500,000.

E. N. Harris, 2218 Chestnut Street, Philadelphia, has awarded a general contract to the Smith-Hardican Co., 1809 Callowhill Street, for a one-story automobile service, repair and garage building, 195 x 200 ft., to cost in excess of \$100,000 with equipment.

The Camden Bridge Garage Co., Inc., Camden, N. J., has work in progress on a new multi-story service, repair and garage building on the Delaware River bridge plaza, to cost in excess of \$400,000 with equipment. The company is disposing of a bond issue of \$450,000, a portion of the fund to be used for the work.

The Freihofer Baking Co., Twentieth Street and Indiana Avenue, Philadelphia, has acquired property adjoining its plant at Trenton, N. J., totaling about 30,000 sq. ft. of land, as a site for an addition to cost in excess of \$100,000.

The United Ice & Coal Co., Seventh and Forster Streets, Harrisburg, Pa., has plans for a one-story ice-manufacturing plant, 80 x 100 ft., to cost about \$130,000 with equipment. Harvey DeWalt is in charge.

The Board of Education, New Castle, Pa., contemplates the installation of manual training equipment in a proposed new junior high school to cost in excess of \$250,000, for which plans have been authorized.

The Hahn Motor Truck Corporation, Hamburg, Pa., has been organized to take over and consolidate the Hahn Motor Truck Co., Hamburg; Hahn Sales & Service, Inc., Allentown, Pa.; Bethlehem Motors Corporation and its subsidiary, the Lehigh Truck Co., both of Allentown. The consolidated company will continue to operate all of the existing plants, with the Bethlehem company works of 175,000 sq. ft., floor space, and the Hahn plant of 75,000 sq. ft. The latter plant will be given over to the manufacture of motor trucks up to 6 tons capacity, and will be extended with additional facilities for the manufacture of bus bodies, truck bodies and cabs; the Bethlehem model motor trucks will be continued, while in connection with Lehigh trucks, it is proposed to begin production at an early date on a new 1-ton light motor truck of advanced design. William G. Hahn, heretofore president of the Hahn company, will be chairman of the board of the new company, and Ezra C. Bull, previously head of the Lehigh company, will be president; Adam

G. Hahn, L. K. Gordon and C. E. Kline will be vice-presidents; and Arthur J. Kooman, secretary and treasurer.

The Borough Council, Lansdale, Pa., is having plans prepared for a new sewage pumping plant. A fund of \$75,000 is available for this and system extensions. Albright & Mebus, 1502 Locust Street, Philadelphia, are consulting engineers.

The H. Sheldon Mfg. Co., Elkland, Pa., manufacturer of hardwood flooring, turned wood products, etc., is considering the early rebuilding of the portion of its mill destroyed by fire Dec. 10, with loss reported at \$100,000 including equipment. O. C. Stalker is head.

The Board of Education, Norristown, Pa., plans the installation of manual training equipment in a proposed three-story junior high school, estimated to cost \$300,000, for which plans will be prepared by Ritter & Shay, Fifteenth and Chestnut Streets, Philadelphia, architects.

The Newburg Electric Co., Newburg, Pa., is completing arrangements for the acquisition of the Southampton Electric Light & Power Co., and the Mount Vernon Electric Light & Power Co., both operating in a portion of Cumberland County, and plans expansion in the respective districts, including transmission line construction.

S. L. Allen & Co., Inc., manufacturer of agricultural implements, Philadelphia, advises that it has not asked bids on an addition to cost \$50,000, as recently stated, but is only inclosing its steel bins and a portion of its railroad siding at an approximate cost of \$10,000.

The Lansdale Foundry Co., Inc., Lansdale, Pa., has been incorporated with a capital stock of \$100,000 to manufacture gray iron and semi-steel castings. The incorporation only indicates a change of ownership in the old Lansdale Foundry Co., Inc., and no changes will be made in its policy.

The Hanover Engineering Co., Hanover, Pa., has purchased the business of the General Gas-Electric Co., Hanover, Pa., and will manufacture Genco light products formerly made by the latter company. It will also do general machine contract work.

The Lehigh Boiler & Steel Co., 375 Whitehall Street, Allentown, Pa., a new corporation, has engaged in the manufacture of boilers and general steel products. It has leased the plant of the former McDermott Engineering Co. and B. J. McDermott has been made general manager. The company is in the market for electric welding apparatus, an air compressor and other machinery.

The N. & G. Taylor Co., Philadelphia, manufacturer of tin plate, has removed its general offices from 300 Chestnut Street to the Liberty Trust Building, Broad and Arch Streets, and will occupy the entire 16th floor.

St. Louis

ST. LOUIS, Dec. 13.

PLANs are being considered by the Massey-Harris Harvester Co., Batavia, N. Y., manufacturer of farm machinery, for a new factory branch and assembling plant at Kansas City, Mo., to cost in excess of \$50,000. Nolan C. Thompson, 1308 West Tenth Street, Kansas City, is local representative.

The Southwestern Bell Telephone Co., Eleventh and Oak Streets, Kansas City, Mo., will take bids on a general contract early in January for a new one and two-story equipment, storage and distribution plant, 120 x 180 ft., with automobile service, repair and garage building, 108 x 145 ft., to cost about \$280,000. I. R. Timlin, Boatman's Bank Building, St. Louis, is architect.

Officials of the Gleaner Harvester Mfg. Co., Independence, Mo., manufacturer of harvesting and kindred equipment, have organized the Gleaner Combine Harvester Corporation, to take over and expand the present company. Property has been acquired at Kansas City, Mo., and plans are being considered for a new one and two-story plant, including foundries, machine shop and assembling works, reported to cost in excess of \$300,000 with equipment. S. Hugh Hale is chairman of the board; W. J. Herman, president; and W. B. Chauncey, secretary and treasurer.

The Missouri Pacific Railroad Co., St. Louis, will soon begin the construction of its proposed engine house, with repair facilities, at Nevada, Mo., to cost in excess of \$75,000. E. A. Hadley is chief engineer.

The Missouri Portland Cement Co., Post Dispatch Building, St. Louis, is said to have concluded negotiations for the purchase of about 400 acres at Batesville, Ark., including limestone deposits, and contemplates the early construction of a new mill, to cost in excess of \$500,000 with equipment. Quarry machinery will be installed for the development of the limestone lands.

The Common Council, Searcy, Ark., is completing plans for a new municipal waterworks, including pumping ma-

chinery, etc., to cost \$75,000. Dickinson & White, Boyle Building, Little Rock, Ark., are engineers.

The Western Battery Co., Kansas City, Mo., care of the Henrici-Lowry Engineering Co., Security Building, engineer, has plans for a new one-story factory, 90 x 125 ft., including assembling department.

The Gould Light & Ice Co., Gould, Ark., is planning the early rebuilding of the portion of its electric power house and ice plant, recently destroyed by fire, with loss close to \$50,000 including equipment. D. V. Leatherman is president.

The Gibson Oil Co., Fort Smith, Ark., is said to be considering the establishment of a new storage and distributing plant to cost about \$50,000 with equipment.

The Atkinson Armature Works, 116 East First Street, Pittsburg, Kan., is arranging for a one-story addition to its electrical equipment plant.

The Empire Refineries, Inc., Tulsa, Okla., has authorized plans for rebuilding the portion of its oil refinery at Cushing, Okla., recently destroyed by fire, with loss reported close to \$350,000 including equipment.

Cincinnati

CINCINNATI, Dec. 13.

MACHINE tool sales the past week have been fairly good, and some local builders report that bookings in the first 11 days of December were ahead of those in the same period in November. Absence of the usual sharp decline in orders as the holidays draw near is a source of encouragement to the local trade. Production continues at a satisfactory rate and the present scale of operations is expected to be maintained well into 1927. A considerable portion of the equipment purchased by the Illinois Steel Co. was awarded to manufacturers in this district; the Niles-Bement-Pond Co. will supply a 60-in. x 20-ft. heavy planer, two 30-in. x 10-ft. planers, two 36-in. x 24-ft. lathes, one 6-ft. radial drill, one 5-ft. radial drill, a 62-in. heavy boring mill and a 20-ft. boring mill, and a Cincinnati builder will furnish five 26-in. engine lathes and two 18-in. engine lathes.

The Norfolk & Western has bought a 27-in. x 22-ft. lathe and an 8-ft. x 1/2-in. bending roll. This carrier is expected to complete purchases against its recent list within the next 10 days. The Chesapeake & Ohio is reported to be preparing a large list of tools to be issued early in 1927. It is understood that the inquiry will be the largest put out by that road in several years. The Duluth Brass Works Co., Duluth, Minn., has bought a No. 7 car box borer, and a local machine tool company has purchased a thread miller.

At the receiver's sale on Dec. 6, of the assets of the John Steptoe Co., Cincinnati, machine tool manufacturer, the Rahn-Larmon Co., Cincinnati, purchased the patterns and manufacturing rights of the Steptoe lathe; the Western Machine Tool Co., Holland, Mich., bought the patterns and manufacturing rights of the Steptoe shapers; and the Artisan Mfg. Co., Cincinnati, was the successful bidder for the patterns and manufacturing rights of the Steptoe milling machines. The buildings and real estate were purchased by the Bank of Commerce, Cincinnati. The sale marks the passing of the first company to make machine tools in Cincinnati, John Steptoe having come from England in 1845 to establish a shop in this city.

The Pollak Steel Co., Cincinnati, which is dismantling its local plant and disposing of equipment, has leased offices in the Temple Bar Building, Court and Main Streets, and will move its general offices there about Dec. 15.

The Daniel Plow Co., New Zimmerman Building, Springfield, Ohio, has been incorporated with a capital stock of \$50,000 to manufacture wheelless plows and power lifts for Fordson tractors.

The Champion Coated Paper Co., Hamilton, Ohio, is planning the early rebuilding of the portion of its power plant destroyed by fire Dec. 4, with loss estimated at \$50,000 including equipment.

The City Council, Barberton, Ohio, is considering the installation of pumping machinery in connection with proposed extensions and improvements in the municipal waterworks, for which a bond issue of \$180,000 has been approved.

The Kentucky-Tennessee Light & Power Co., Guthrie, Ky., is planning enlargements in its ice-manufacturing plant at Cloverport, Ky., and the installation of additional equipment.

The Common Council, Crossville, Tenn., will install pumping machinery, steel water tank and tower, and auxiliary equipment in connection with a proposed municipal water system to cost \$100,000. Bonds have been voted.

The Shearman Concrete Pipe Co., Hiawasse Avenue, Knoxville, Tenn., is planning to rebuild its machine shop, recently partially destroyed by fire, with loss reported at \$21,000 including equipment.

The Allen Mfg. Co., Tenth and Cedar Streets, Nashville, Tenn., operating a general machine works, plans extensions and improvements to cost about \$15,000.

Milwaukee

MILWAUKEE, Dec. 13.

JUDGING by the improvement in inquiry the past week, considerable machine-tool business is in the foreground, and prospects for the early part of the new year are regarded as being good. There is a steady run of single orders to maintain operations at a moderately satisfactory rate until after the holidays. Automotive industries again are most prominent among those putting out inquiries. The used tool market is quiet.

The Ideal Stitcher & Mfg. Co., Racine, Wis., has been incorporated with \$25,000 initial capital to take over and develop a department of the F. J. Greene Engineering Works, Racine, which for nearly five years has been manufacturing machines for stitching books as well as paper board boxes and other containers. The principals are F. J. Greene, James M. Easson and C. S. Greene. A material increase in production is contemplated which will require some additional equipment.

The Stowell Co., South Milwaukee, Wis., manufacturer of malleable castings, hardware, etc., sustained a heavy loss by fire on Dec. 4. The main foundry and twelve other buildings were damaged and the machinery is almost a total loss. The damage is estimated at upward of \$100,000. The company has been operating under a trusteeship for some time. Frederick L. Slyyer, president Northwestern Malleable Iron Co., Milwaukee, is trustee.

The Wisconsin Southern Gas Co., capital stock \$100,000, and the Ryan Engineering & Management Corporation, capital stock \$100,000, have been incorporated at Delavan, Wis., by Joseph F. Ryan and associates to build an artificial gas plant and distributing system to serve Delavan and several nearby communities. Work is to start about Feb. 1. An investment of \$250,000 or more is contemplated.

The Merkle Chevrolet Co., 789 Thirty-second Street, Milwaukee, has let the general contract to the Meredith Brothers Co., 253 Washington Street, local, for a two-story addition, 70 x 90 ft., to its automotive headquarters building. The upper floor will be equipped as a machine shop. George E. Merkle is president and general manager.

Pittsburgh

PITTSBURGH, Dec. 13.

THE local machine tool trade is more occupied with prospective orders than current sales. Some houses have found this month's business a little better than that in November and a few sales running fairly high in monetary value have been closed. The railroads are expected to buy freely early in 1927, and the amount of rolling stock before the market encourages the belief that car and equipment shops will place some orders. In the Erie, Pa., district, several metal-working companies have plans for extensions and equipment additions. The Erie Malleable Iron Co., is contemplating additions for the manufacture of the Van malleable wheel for automobiles. The Valley Mould & Iron Corporation, which will move its plant from Sharpsville, Pa., to Hubbard, Ohio, will require some new equipment in addition to that taken from the old plant.

The Union Electric Co., 933 Liberty Avenue, Pittsburgh, a subsidiary of the General Electric Co., has acquired a six-story building at Duquesne and Evans Ways, totaling 60,000 sq. ft. of floor space, and will remodel for a new works.

Fire, Dec. 7, destroyed a portion of the plant of the Enameled Metals Co., 61 Bridge Street, Etna, Pa., with loss reported at \$50,000 including equipment. It is planned to rebuild. L. R. Quinn is vice-president, and Peter Mackillorey, general manager.

Contract has been let by the Republic Bank Note Co., 2818 Forbes Street, Pittsburgh, manufacturer of paper products, to the Rust Engineering Co., 311 Ross Street, for its proposed three-story addition, 90 x 145 ft., to cost about \$300,000 with

equipment. Hunting, Davis & Dunnells, Century Building, are architects.

The Appalachian Electric Power Co., Bluefield, W. Va., is reported to be arranging an expansion and improvement program for 1927, to cost about \$500,000.

The Fletcher Enamel Co., Dunbar, W. Va., has tentative plans for a one-story addition and the installation of new equipment. It is proposed to begin work in the spring.

The Charleroi Steel & Foundry Co., Charleroi, Pa., recently organized, has arranged for the establishment of a local plant and will begin operations at once. John K. Tener, former governor of the State, is president.

The Acme Glass Co., Lumberport, W. Va., recently organized with a capital of \$100,000, has taken over the former local plant of the Mound City Glass Co., bankrupt, for the establishment of its works. Facilities will be provided for the employment of about 150 operatives.

The Columbia Gas & Electric Corporation, Charlestown, W. Va., recently formed by a merger of the Columbia Gas & Electric Co., and the Ohio Fuel Corporation, is arranging for a new sale of common stock to approximate \$22,500,000, a portion of the proceeds to be used for extensions and improvements.

The North Pole Ice Co., Fairmont, W. Va., will proceed with the construction of a new two-story plant, 40 x 75 ft. It is also considering the enlargement of its plant at Farmington, W. Va. A. V. Lynch is one of the heads of the company, in charge.

The Compressed Gas Co., Wheeling, W. Va., manufacturer of industrial gases, etc., is reported planning extensions in its plant at Huntington, W. Va., and the installation of additional equipment.

Gulf States

BIRMINGHAM, Dec. 13.

PLANS are being considered by the Lone Star Ice Co., North Calhoun and Twenty-first Streets, Fort Worth, Tex., for a new one-story ice-manufacturing plant in the Rosen Heights section, to cost close to \$55,000, with machinery.

The Florida Variety Boat Co., Orlando, Fla., has plans under advisement for a new boat construction and repair plant on Lake Conway, specializing in motor boats, launches, row boats, etc. Walter C. Meloon is head.

The Stockham Pipe & Fittings Co., 4100 North Tenth Avenue, Birmingham, manufacturer of cast iron pipe, valves, fittings, etc., has completed plans for a one-story addition, to cost about \$60,000 with equipment.

The Common Council, Levelland, Tex., will install pumping machinery, elevated steel tank and tower and auxiliary equipment in connection with a proposed new municipal waterworks, for which a bond issue of \$50,000 is being arranged. Hawley & Roberts, Lubbock, Tex., are engineers.

C. N. Hilton, Dallas, Tex., and associates plan the installation of refrigerating equipment in a proposed new public market building, to cost \$200,000. Bryan & Sharpe, Dallas, are architects.

M. D. Elliott, Orange City, Fla., has inquiries out for woodworking tools and machinery.

The Florida Power & Light Co., Miami, Fla., has plans under consideration for a new ice-manufacturing and refrigerating plant at Punta Gorda, Fla., to cost \$160,000 with machinery.

The Board of Education, McAllen, Tex., is planning the installation of manual training equipment in its three-story high school, to cost about \$200,000, for which bids will be asked at once on a general contract. R. H. Cameron, City National Bank Building, San Antonio, Tex., is architect.

The General Power & Light Co., Senatobia, Miss., is reported to be planning the early construction of a new steam-operated electric power house, to cost more than \$225,000 with machinery. The company recently closed negotiations for the purchase of the municipal electric power plant.

The Orange State Motor Co., Inc., 708 Madison Street, Tampa, Fla., will proceed with the erection of a one-story service, repair and garage building, 195 x 210 ft., for which plans have been drawn by F. J. Kennard & Son, 303 Zock Street, architects. Shop equipment will be installed.

The Central Power & Light Co., Frost National Bank Building, San Antonio, Tex., is said to have preliminary plans for extensions and improvements in its power plant at Crystal City, Tex., with the installation of additional equipment.

S. S. Goffin, 2724 Main Street, Jacksonville, Fla., has been inquiring for crushing machinery for handling oyster shells.

The Common Council, Slidell, La., plans the installation of pumping machinery in connection with a proposed municipal waterworks and sewage system, to cost \$175,000, for which bids will be asked before the end of the month. J. W. Billingsley, Interstate Bank Building, New Orleans, La., is consulting engineer.

The Birmingham Fabricating Co., 112-14 South Twenty-second Street, Birmingham, has work under way on a new plant, consisting of two main one-story buildings, 90 x 90 ft., and 86 x 90 ft., to be ready for service in about 60 days. It will be used for the manufacture of ornamental iron products, wire goods and other iron and steel specialties. L. H. White and C. F. Hyrne are heads.

Cleveland

CLEVELAND, Dec. 13.

THE volume of machine tool business continues slight with sales hardly up to December average. Few orders call for more than single machines. There is not much new inquiry and some business that has been in prospect is slow in coming to a head. The market in Detroit is extremely dull, as automobile companies are marking time. Inquiry for used machinery is fair but sales are slow. Considerable used machinery has come on the market recently. There is an active demand for woodworking machinery.

The Seiberling Rubber Co., Barberton, Ohio, will build a one-story addition, 80 x 280 ft. Roy Richards, Metropolitan Building, Akron, is the architect.

Freeman & Jones, Inc., 5713 Euclid Avenue, Cleveland, has taken a general contract for a sewage disposal plant to be built at Ravenna, Ohio.

The Firestone Tire & Rubber Co., Akron, Ohio, is taking bids for a five-story factory addition involving an expenditure of \$300,000. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are the architects.

The American Stove Co., 4415 Perkins Avenue, Cleveland, has placed a general contract with J. C. F. Shafer, Smythe Building, Cleveland, for a one-story factory, 52 x 182 ft.

The Bryant Heater & Mfg. Co., 17825 St. Clair Avenue, Cleveland, has asked for bids for a one-story addition, 100 x 250 ft. Fox, Duthie & Foose, 6523 Euclid Avenue, Cleveland, are the architects.

The Board of Education, Dennison, Ohio, plans the installation of manual training equipment in its proposed new high school to cost \$285,000, for which plans are being drawn by H. Kerr Giffen, First National Bank Building, Canton, Ohio, architect.

The Alliance Buick Co., Alliance, Ohio, is completing plans for a four-story and basement service, repair and garage building to cost about \$200,000. Robert S. Marsh & Associates, 122 East Broad Street, Columbus, Ohio, are architects.

Detroit

DETROIT, Dec. 13.

IN connection with a general expansion program to cost about \$3,000,000, the L. A. Young Industries, Inc., 9210 Russell Street, Detroit, manufacturer of springs, wheels and other automobile equipment, will soon begin the construction of a new power plant to serve the present works and new units, to cost more than \$200,000 with equipment. Work is nearing completion on the first unit of the program, costing close to \$1,000,000 with equipment. Christian W. Brandt, Detroit, is architect.

The General Necessities Corporation, 2457 Grand River Boulevard, Detroit, operating ice-manufacturing plants and other public utilities, is disposing of a note issue of \$1,000,000, a portion of the proceeds to be used for expansion and improvements. David A. Brown is president.

The Consumers Power Co., Jackson, Mich., is said to be planning for enlargement in its steam-operated electric power house at Kalamazoo, Mich., to develop a capacity of 26,000 hp.

The Olds Motor Works, Lansing, Mich., has begun the erection of a new heat-treating plant, 70 x 120 ft., for which a general contract was recently let to the Reniger Construction Co., Lansing.

The William Moulds Foundry Co., Benton Harbor, Mich., manufacturer of brass and bronze castings, etc., is planning for a new one-story foundry addition.

Negotiations are under way by the American Piston Co., Detroit, for the establishment of a new plant at Tecumseh, Mich., where a committee is developing a fund of \$25,000 to

insure the project. The company proposes to remove its Detroit works to the new location, expanding capacity.

Fred J. Weiss, Harvey E. Schweitzer and Carl W. Bonbright, receivers for the Flint Motor Axle Co., Flint, Mich., have received permission from the court to dispose of the assets of the company, including plant and equipment, for \$23,500.

Plans are being completed for the early establishment of a plant at Detroit for the manufacture of a new moderate-priced automobile, to be known as the Falcon-Knight, to sell at about \$1,000. A company has been organized by John A. Nichols, Jr., for a number of years connected with Dodge Brothers, Inc., and John A. Willys, head of the Willys-Overland Co., Toledo, Ohio. The name of the new company has not as yet been announced. Offices will be established in the Majestic Building. R. N. Harger and R. H. Allen, both previously connected with Dodge Brothers, Inc., will be prominent in the new organization.

The Voigtman Metal Window Corporation, Reed and Fulford Streets, Kalamazoo, Mich., has been incorporated with a capitalization of \$600,000 to transact all the business of Voigtman & Co., Chicago, outside of Chicago and Cooke County, Ill. It has purchased the plant of the Kalamazoo Motors Co. at Kalamazoo and the majority of the equipment needed has been bought. The company will manufacture the same products as the Chicago organization, namely solid and hollow metal double hung windows.

The American Sign Co., Kalamazoo, Mich., has been incorporated as the American Sign Corporation with a capitalization of \$250,000, and will continue to manufacture porcelain enameled steel signs and paint, lacquer and small finished electrical display signs. The company has purchased additional ground for a new factory, increasing its output by 50 per cent, and is yet in the market for certain equipment. The officers are: Frank E. Kelsey, president; Burton C. Wilson, vice-president and general manager; Fred W. Sutherland, secretary and treasurer; J. Ross Thompson, sales manager galvanized division, and Wray P. White, sales manager porcelain division.

Pacific Coast

SAN FRANCISCO, Dec. 8.

BENJAMIN COPE, Newport, Cal., has plans for the immediate construction of a new boat-building works consisting of a main building, 60 x 110 ft.; machine shop, 45 x 60 ft., and marine ways. The project will cost in excess of \$35,000 with equipment.

The Union Pacific Railway Co., Union Pacific Building, Omaha, Neb., has rejected bids recently received for its proposed engine house and repair shops at Ogden, Utah, and will proceed with the project by day labor. It is reported to cost about \$220,000 with equipment. R. L. Huntley is chief engineer.

The Board of Education, Lewiston, Idaho, is considering the installation of manual training equipment in its proposed new three-story senior high school to cost about \$200,000, for which plans are being drawn by C. Richardson, Lewiston, architect.

The Beaver Portland Cement Co., Portland Building, Portland, is completing plans for extensions and improvements in its mill at Gold Hill, Ore., consisting of new buildings and additional kilns, to cost about \$100,000 with equipment.

The Pacific Bone, Coal & Fertilizer Co., American Bank Building, San Francisco, has awarded a general contract to Barrett & Hilp, Harrison Building, for a three-story addition to its fertilizer plant in the Bay Shore district, Visitation Valley, to cost about \$65,000. The engineering department of the company is in charge.

The United Casting Co., 824 Wilson Street, Los Angeles, has filed plans for the erection of a new one-story foundry, 40 x 60 ft.

The Board of Education, Los Angeles, is said to be planning the construction of a manual training building at the new group high school in the Eagle Rock section, to cost about \$275,000. Carleton M. Winslow, Van Nuys Building, is architect.

The Portland Gas & Coke Co., Gasco Building, Portland, has plans for an addition at Gasco Station, to be equipped as a generator unit, to cost approximately \$100,000.

The Burdick Minerals Corporation, Hermosa Beach, near Los Angeles, has plans for a new one-story mill, 85 x 125 ft., with installation to include washing and pulverizing equipment, etc.

R. H. Orr, Corporation Building, Los Angeles, architect, will soon begin the construction of a five-story automobile service, repair and garage building, 92 x 280 ft., to cost in excess of \$175,000.

The Union Mfg. Co., New Britain, Conn., maker of lathe, drill and planer chucks and grey iron castings, has appointed the Mountain States Rubber Co., Salt Lake City, Utah, its distributor in the States of Utah, Arizona, Montana and Nevada.

Indiana

INDIANAPOLIS, Dec. 13.

BASS KNOWLTON & CO., 310 North Meridian Street, Indianapolis, architects, have plans for a two-story addition to the service, garage and repair building at West New York and Senate Streets, occupied by the Post Office Department, for motor trucks and cars. It will be 50 x 120 ft., and cost about \$65,000.

The Walter Bates Steel Co., Gary, Ind., has superstructure in progress on its second plant unit to cost \$65,000, for which a general contract recently was let to the General Construction Co., Theater Building.

The Board of Education, Attica, Ind., is said to be planning the installation of manual training equipment in a proposed two-story and basement high school, to cost \$175,000, for which bids will be asked soon on a general contract. Johnson, Miller, Miller & Yeager, 30 North Fifth Street, Terre Haute, Ind., are architects.

The Roamer Motor Co., Kalamazoo, Mich., manufacturer of automobiles, has concluded arrangements for the purchase of the plant and business of the Rutenberg Motor Co., Logansport, Ind., specializing in the production of six-cylinder motor trucks. The purchasing company proposes to continue operations as a subsidiary. A. C. Barley, president Roamer company, organized the Rutenberg interest some time ago.

The Brandt Radio Power Corporation, Terre Haute, Ind., care of the Chamber of Commerce, Terre Haute, has been organized recently to manufacture radio equipment. A local building has been leased and equipment will be installed at an early date.

The Interstate Public Service Co., Indianapolis, is disposing of a bond issue for \$10,000,000, a portion of the proceeds to be used for extensions and improvements, and general financing.

Foreign

BIDS are being asked by the director general of navigation, Port of Buenos Aires, Argentina, until Feb. 24, for three Diesel electric locomotives, each with hauling capacity of 10 tons. Specifications on file at the office of the Electric Equipment Division, Bureau of Foreign and Domestic Commerce, Washington.

The Westinghouse Electric International Corporation, 150 Broadway, New York, has contracted with the Paulista Railway, Brazil, for the electrification of a section of its line from Rio Claro to San Carlos, 43 miles, including complete transmission, substation and auxiliary equipment. The contract is said to total \$1,500,000.

The Government of Czechoslovakia, Prague, in conjunction with the Presov Electrical Works, Presov, is projecting plans for the construction of a central hydroelectric generating plant on the Poprad River, with initial capacity of about

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6000 hp., to be known as the Eastern Slovak Electric Power Works. A transmission system also will be constructed. The American Consulate, Prague, C. S. Winans, consul general, has information regarding the project.

The United Industrial Corporation, known as Viag, Berlin, Germany, controlled by the German Government, is disposing of a bond issue of \$6,000,000 in the United States, a portion of the proceeds to be used for general extensions, improvements and financing. The company operates plants for the production of aluminum, nitrate, rolling mill and agricultural machinery, and has a group of electric generating plants.

The Hungarian Government, Budapest, Hungary, is arranging for early approval of plans for the electrification of the Hungarian State Railways from Budapest to Esztergom. The work will include the construction of a central electric generating plant with transmission system. The railroad will purchase about 55 electric locomotives. The entire project is estimated to cost more than \$100,000,000. Later it is proposed to electrify the system from Budapest to Hatvan. Information at the office of the American Consulate, Budapest, Thomas D. Bowman, consul general.

Canada

TORONTO, Dec. 13.

THE holiday season is beginning to have an effect on machine tool sales, which in the past week were much below those of the previous week. New inquiries, are coming in steadily. The demand from automotive manufacturers has fallen off, but a good volume of single orders from repair plants and garages is being received. Practically all lines of manufacturing industry have shown some improvement in operations this year and machine tool dealers and manufacturers are optimistic regarding the future. Many have large orders on hand which will extend well into the new year.

The Montreal Armature Works, Ltd., 131 St. Alexander Street, Montreal, is making progress with the erection of its plant addition, and additional contracts have been let recently. It is understood that some tools and machinery are still to be purchased.

The Central Spring Co., 133 Ritson Road N., Oshawa, Ont., is progressing with the erection of an addition to its plant at a cost of \$15,000. Some new tools will be purchased.

The City Council, Toronto, is planning a 30,000,000 gal. electrically operated pumping plant to clear the waters of Ashbridges Bay, at a cost of \$40,000. Thomas Foster is chairman of the Board of Control.

The Electric Controller & Mfg. Co., 2700 East Seventy-ninth Street, Cleveland, has removed its Toronto office from the Traders Bank Building to 415 Metropolitan Building.

Western Canada

The Maple Leaf Steel Mills, Edmonton, Alta., has been incorporated with a capital stock of \$500,000 and has acquired the plant formerly operated by the Edmonton Iron Works. The company proposes to extend the scope of its business, as previously carried on by erecting new buildings, installing new tools for the manufacture of mining machinery, saw-mill machinery, oil well supplies and some lines of agricultural implements. General foundry repair work will also be done. Swan Swanson is president; P. E. Lessard, vice-president; A. H. Anderson, secretary-treasurer. The directors include Joseph W. Adair, L. A. Wildman, A. S. Matheson and others.

The machine shop of Ralph R. Robertson, at High River, Alta., has been purchased by E. W. Thornton, Calgary, Alta., who will carry on the business.

Plans are being prepared by S. J. Atchison, architect, Coristine Building, Montreal, for the erection of a power plant at East Kootenay, B. C., for the East Kootenay Power Co., Sentinel, B. C., to cost \$100,000.

On the petition of the bondholders, the Winnebago County Circuit Court at Oshkosh, Wis., has appointed W. G. Maxey receiver of the Oshkosh Motor Truck Mfg. Co., Oshkosh, specializing in the manufacture of four-wheel drive hauling equipment. The proceeding is a friendly one to facilitate a reorganization of the financial structure without jeopardizing the continuous operation of the plant. Authority has been granted for the issuance of receiver's certificates so that immediate capital will be provided for operations. The concern is reported to be moderately well provided with orders.

THE LAST WORD

(Contributed by the Reader Service Department of the Iron Age Publishing Co.)

“OUR workmen steal the soap for washing purposes. Can you help us?” a Chinese customer complained to R. H. Miller Co., Homer, N. Y., manufacturer of wire-drawing soap.



Whereupon the Miller chemist set to work to find something that would discourage thefts without impairing the lubricating qualities of the soap. He discovered that the addition of a minute quantity of blue aniline dye would produce wondrous results.

A shipment was made to China, and the wire manufacturer began using it without advertising the fact.

The next morning he noticed with astonishment that three of his employees had turned a ghastly green overnight. “Stomach trouble or jaundice?” he inquired. “No,” they answered in unison, and with guilt written all over their hands and faces they murmured: “! ? * - e ! / * . * £ ! ** !,” which is Chinese for, “Devil soap! Never again!!”

“On a diet?” a salesman inquired of his friend, who had just ordered crackers and milk.

“No, on commission,” was the reply.

Any sales manager will tell you that men work hardest and spend less when on commission, and any works manager will agree that the average workman on commission, i.e., on a piece-work or bonus basis, produces more than the man on straight time. The twenty-thousand-a-year crack salesman and the \$35-a-week lathe hand are brothers under the skin, as Kipling forgot to mention.



About half the workers in the metal trades are paid straight time, an investigation by the Sherman Corporation reveals. Roughly, one-fourth are on piece-work rates and the remaining fourth are paid a premium for high production. It is significant that the automotive industry, which is credited with a high rate of labor efficiency, has two-thirds of its wage earners on the premium basis.

By their very nature many jobs cannot be compensated for other than on a straight hourly wage schedule. But in more cases than you realize Old Man Inertia is responsible for the failure to make fuller use of the advantages inherent in the individual or group premium plan.

“He hasn’t done right by our public,” the Federal Trade Commission told the United States Supreme Court in a recent anti-trust case. The accused had purchased the capital stock of a possible competitor. “Correct you are,” said the court. “You did perfectly right in ordering him to sell that stock.”



Encouraged, the commission brought up for confirmation another anti-trust case, in which a manufacturer had purchased the physical assets of a competitor. The commission looked hopeful, but the court grew cold and stern. “You are exceeding your authority,” the commission was told. “This is no affair of yours.”

The moral, gentle readers, is: Acquiring a competitive firm by purchase of capital stock is illegal, but buying its physical assets may be within the law.

A. H. D.

